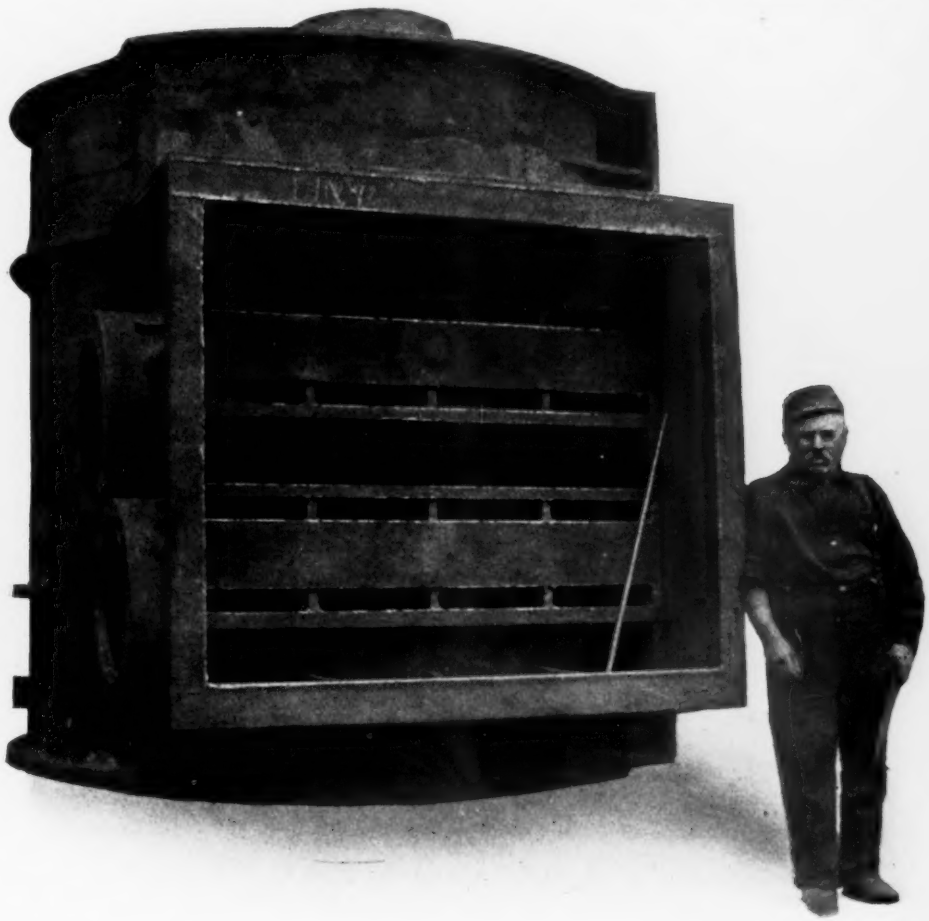
THE FOUNDRY

VOL. 15. DETROIT, MICH., NOVEMBER, 1899. No. 87.

A Creditable Piece of Work.

We herewith give our readers a chance to judge of the inland marine work being done in this country. Our illustration shows a typical example of castings produced by the Detroit Shipbuilding Company, Detroit, Mich., formerly known as the Dry-Dock Engine Works. This casting is the low pressure cylinder of a new steamer known as No. 131, now being built by the Detroit Shipbuilding Company for the White Star Line, and weighs a little over 13 tons. It is 82 inches in diameter and stands 8 ft. 5 inches high.

The intermediate cylinder for these engines is 51 inches in diameter and weighs nearly 9½ tons. The high pressure cylinder has a diameter of 33 inches and is in itself a good sized casting. The stroke is 72 inches. Working pressure of steam, 170 pounds per square inch.



LOW PRESSURE CYLINDER, WEIGHT THIRTEEN TONS.

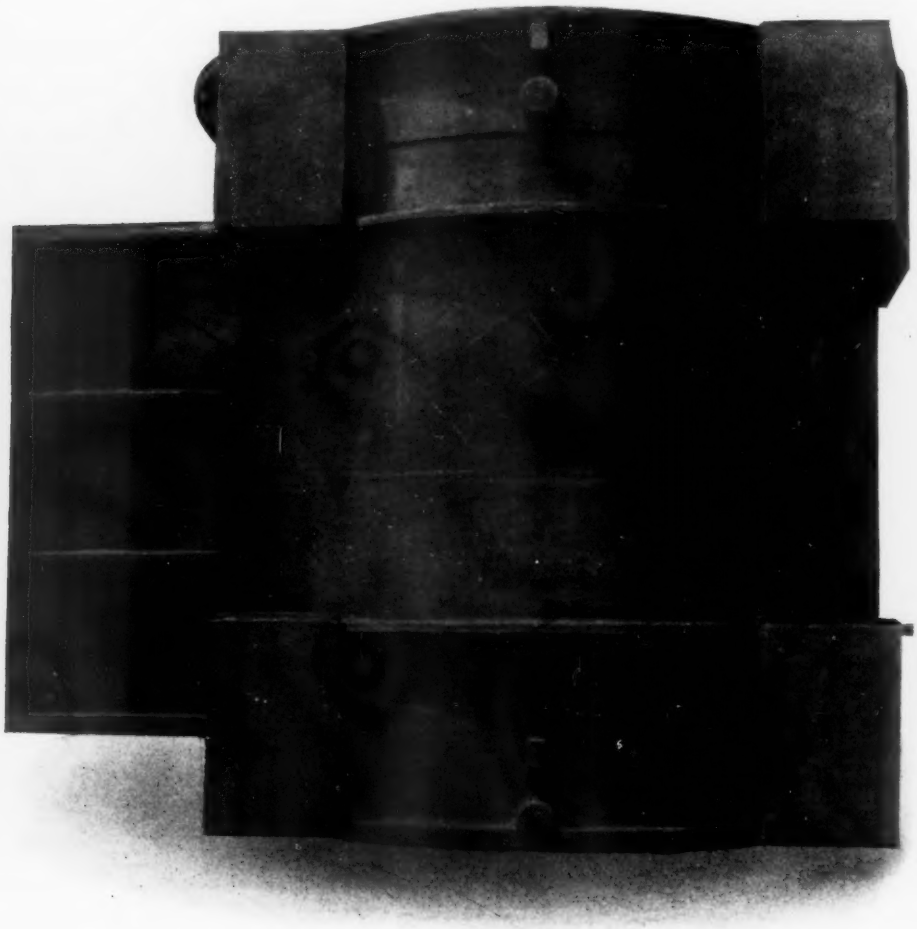
What makes this job the more creditable is that it, and many more like it, is turned

out with the commonest kind of foundry equipment. The expansion of this company and the character of its work has long ago outgrown the capacity of its foundry. This is the largest cylinder ever made for use on the great lakes. When this foundry was built the largest lake steamers were not half the size of those that traverse the same waters to-day, and the hand power cranes and low head room of the shop were not noticed so much then. Standing this cylinder on end in the same shop to-day shows in striking contrast how greater work is demanded of the foundries at the present time.

To turn out such work with facilities never intended to cover the present time reflects great credit upon those who had it in charge. To Mr. Robert Smith, foreman of the shop, and by the way, a member of Detroit's famous family of Smith Molders, and also to the molders, who must have had to show more or less ingenuity in getting around the lack of mechanical facilities, due credit for this splendid example of the founders' art should be given.

It is to be noted that no matter how perfect a photograph may be, it yet fails to show the best workmanship of a casting, because it can only reproduce what is visible to the camera.

We are indebted to Mr. R. W. Smith, until recently draughtsman of the Detroit Shipbuilding Co., for the photographs from which the illustrations are produced.



ANOTHER VIEW OF THE SAME CASTING.

Skimming Gates.

By ELI H. PEARCE.

As all iron contains more or less dirt or impurities we must provide a suitable means to eliminate these as much as possible, if a clean casting is desired. One of the methods commonly adopted to clean the iron of any dross or dirt that it may contain is a skimming gate in one or the other of its many different forms.

As skimming gates are in daily use in the majority of the foundries it would seem that all molders, who rank as good workmen, would know how to make these as they should be made, but such is not the case, for I find that there are men who can make a very good job of work otherwise, but do not know the first thing about cutting a skimming gate. Considering this fact it may not be out of place to say a word or two on the subject.

Letting Fig. 1 represent the manner in which a skimming gate works it is seen that the iron is poured into gate A, which is connected with the riser B by the channel C. In order for this arrangement to prove an actual skimming gate the riser B must be full of iron until the pouring is completed.

Pouring the iron in at A it flows along the channel C until B is reached, when the dirt will rise in B while the clean iron continues on through the gate D into the mold provided these gates are cut properly.

In order to have a skimming effective, the channel C must be cut so that it is large and puffy in comparison with the gate D that enters the mold, because more iron must be supplied through C, than D will carry off. This will allow the iron to flow slowly from A to B, thereby giving the dirt more time in which to rise. Some writers have tried to illustrate the proportions that should exist between the gates C and D, I will not venture that far, but would always advise that C be as large and deep as possible, while D should be wide and shallow, and of no greater capacity than necessary to supply iron for the size of casting it is to be used on. Make the gate D wide and shallow because it is a well-known fact that a wide shallow gate tends to prevent dirt or slag from entering a mold. I would also advise that the distance from A to B be as great as possible, as this will give the dirt just that much longer in which to rise.

Notice that the channel has a gradual slope from A to B. This is done to assist the dirt in rising. As the joint of the mold has been slicked down firm and hard it becomes necessary to cut up that part of the drag immediately below the channel C with a trowel, and press the sand down with your hand as it certainly will scab when iron strikes it if this is not done. Some judgment must be used, not to make it too soft as the sand will in that case wash away, instead of scabbing.

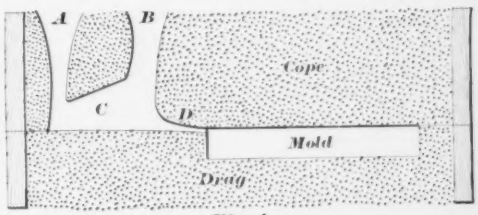


Fig. 1

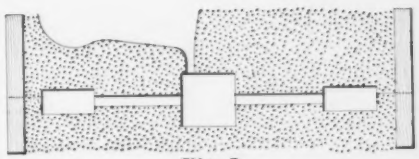


Fig. 2

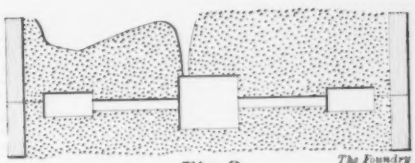


Fig. 3

Sometimes it is only required that certain parts of a casting shall be free of flaws. In a case of this kind introduce the metal into the mold as far as possible from these parts as the casting is generally dirtiest nearest the gate.

Often we cannot make a gate as shown in Fig. 1. Such an instance is shown in pouring a spoked balance wheel having a heavy rim that is turned up. In a case of this kind the pouring should take place from the center, a basin as shown in Fig. 2 being used. Be sure to make this amply

long in order that the dirt will rise before it gets to the finger gate entering the hub of the wheel; also slope it downward towards the gate as this will allow the clean iron from the bottom to go into the mold, while, if the runner sloped upward as in Fig. 3, the top iron, containg more or less dirt, will go into the casting. Do not make this basin too hard or swab it with too much water, as either will cause the sand to scab or cut. Again, use judgment by not making the finger gate too large or it will be impossible to keep the basin full, and its effectiveness will be destroyed.

In conclusion, I wish to say that no matter how well your skimming gates are cut and planned you cannot make a clean casting unless your mold is free of loose sand, and is properly vented and rammed, for as long as I have been in the business I have never seen a skimming gate vent a mold or grab a brush and sweep it out. This must be done by the molder before any kind of a skimming gate will work.

The Poole Molding Machine.

The ability of the molding machine is restricted only by the ingenuity of its maker. There really can be no such thing as a standard molding machine, because the making of each casting will involve different mechanical movements and a variety of accessories must be supplied.

The most successful molding machines are those provided with attachments to suit the particular requirements of the variety of castings to be made. When it is attempted to use a molding machine without providing it with stripping plate, stools and the like where these are needed, the result is a loss of efficiency for each particular casting.

Considerable skill has been shown by Lorenzo Poole, a Worcester mecaanic, in fitting up molding machines for special purposes. Several of the Poole molding machines have been installed at the foundry of the Knowles Loom Works in Worcester, Mass., the foreman of this place, Mr. F. T. Williams, having had more than three hundred patterns put in shape for molding on the Poole machine.

It is very seldom that we come across "three-part" jobs in machine molding, and but few foundrymen would be likely to make the attempt. Fig. 1 shows a flanged sheave molded on this machine. When molded by hand, four of these castings were made in a flask at a cost of seven cents. Since being fitted up for machine molding ten of these sheaves are made in a flask, the price paid for molding being five cents under the new method.

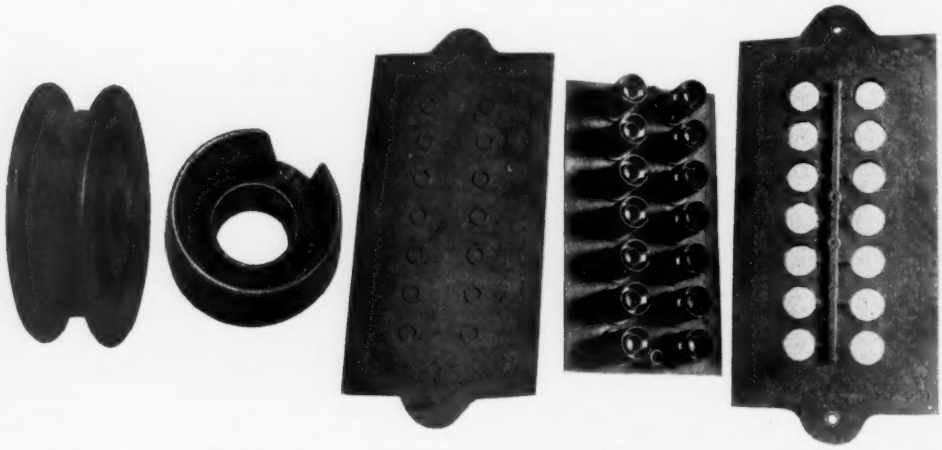


FIG. 1. FIG 2. FIG. 3. FIG. 4. FIG. 5.

EXAMPLES OF WORK DONE ON THE POOLE MOLDING MACHINE.

Fig. 2 shows another casting made on this machine, Figs. 3, 4 and 5 illustrating the practice followed in preparing this job for machine molding. When this casting, Fig. 2, was molded by hand four were made in a flask at a cost of five cents. A glance at the other illustrations shows that fourteen castings are now made in a single mold at a cost of four cents. In hand molding, that part of the mold which has to be lifted had to be secured with "soldiers" or pegs in order to get a clean lift. With the machine, no securing of this kind is necessary, which goes to prove that a ma-

chine will sometimes perform its work more perfectly than is possible by hand. Mr. Poole states that this casting might have been made without stripping plates, but for the fact that the central rim or hub of the casting has very little draft. By using a stripping plate for the outside the sand is prevented from sagging and supported until the pattern is withdrawn.

Fig. 6 gives a front view of the Poole molding machine as arranged for molding the sewing machine arm seen in Figs. 7 and 8. This machine is now in use by the National Sewing Machine Co., of Belvidere, Ill., and is so arranged that it may be operated by one, two or three men, according to the quantity of castings wanted from one pattern. For making the casting, Figs. 7 and 8, a snap flask 12½x15½ inches is used, cast iron bands being inserted in same before ramming up to support the sand against the pressure in casting. The flask is provided with small steel strips at each corner, which extend inwardly and rest on the pattern plate when the flask is placed thereon. The band when dropped in rests on these strips, which prevent the band from dropping down or the mold from sagging when the flask is lifted off, besides protecting the mold against bursting when being poured.

Fig. 9 shows the core used in the casting, Figs. 7 and 8. The rods seen projecting from same, to hold it in place in the mold, are made of cast iron, and put in the core after it is rammed up and dried therein, thus obviating the necessity of using chaplets.

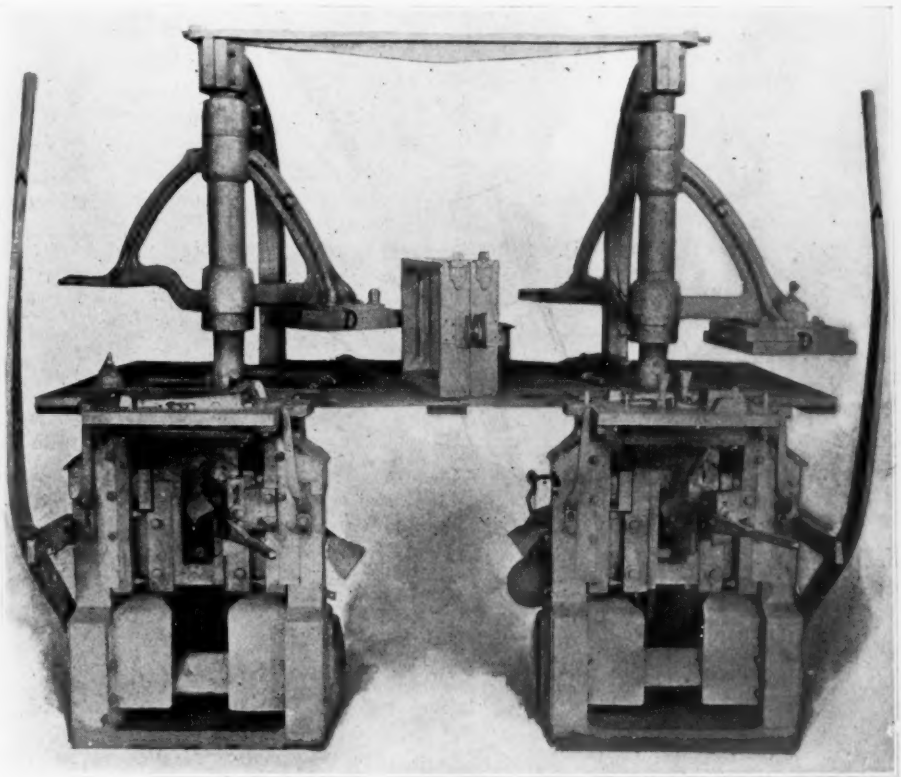


FIG. 6.—THE POOLE MOLDING MACHINE.

There are many castings made where this method of securing cores would not only save time, but also result in less marks appearing upon the casting.

For molding the casting, Figs. 7 and 8, two flasks and three men are employed. While the molder on the left hand side is making the drag portion of the mold, the molder on the right hand side is making the cope, the third man setting the cores and finishing the molds. By the time the first mold is finished and the flask removed the second mold is

ready to be cored, the two flasks thus being kept in continual use.

In operating the machine the levers A are used to create enough pressure upon the sand until it assumes the right hardness. The levers B release the patterns, which descend through the stripping plate. The arms C carry the pressboards D and are swung over the flasks when these have been filled with sand. In ramming the mold the latter is lifted against the press-plate. It will thus

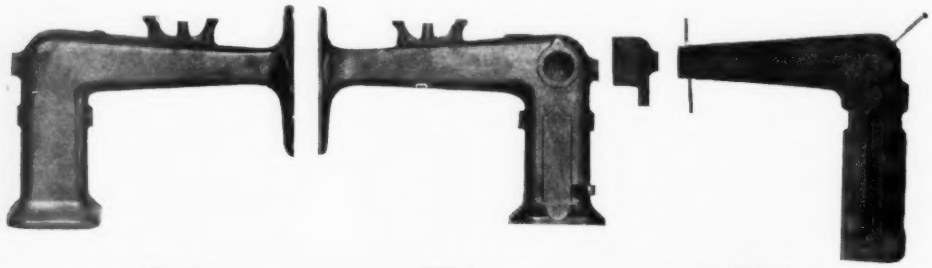


FIG. 7. FIG. 8. FIG. 9

FIG. 10.

be observed that the press arms can only move in a horizontal direction, while the mold proper is confined to move vertically. The arms seen at E are intended to carry an arrangement for pening the mold where this is necessary, which has been found not to be needed in molding the casting under consideration.

Fig. 10 gives a view of some more varieties of castings turned out on this machine.

where stripping plates are not required. Among the innovations brought out by Mr. Poole is a compressible cup sprue, which, when the mold is being rammed, yields to the presser board and resumes its position when this is removed, thus extending above the top of the mold, from which it is easily removed.

Mr. Poole describes his method of fitting up stripping plates as follows:

To make a stripping plate, where the pattern is stripped in both nowel and cope, and where the outlines are irregular I cast the plates, cut out so that there will be a margin of half an inch or more between the pattern and the stripping plate. Plane the plates on both sides, and cut a groove around the cut out part one-quarter inch deep and of the same width. This groove is to keep the soft metal in position. I then drill the holes in the plates for the pins and bushings, which are to receive those of the flasks.

and proceed to finish the plates in the following manner:

Warm plates and followers, laying one of the plates face down on an iron table, set follower in the cut out, and face down on table, and have it come where you want the pattern to register. Then fill the space around the follower with soft metal. The harder this metal and the less shrinkage it has the better it will last. I mix it in different proportions as the case may call for or the pattern require. For ordinary stripping plates a mixture of bar tin 10 parts, zinc 2 parts, antimony 1 part, works well. I have used Babbitt "extra" brand, which also gives good satisfaction and to which I have added antimony with good results.

For a pattern the size of a twelve-inch drop hanger, I pour the stripping plate four up, in order to use the metal at a low temperature. When one plate is poured, turn it over on the table and lay a sheet of wrapping paper over it, cutting out over the follower, so as to find the dowel pin holes, that pinned the two followers together when they were finished as one piece, to have a good match for patterns. Lay second follower on the one poured, putting in dowel pins to keep it exactly in place, lay on the other stripping plate, face down, and pin it to its mate by close fitting pins in the holes that are for the pins and bushings for the flasks, and pour the metal around the follower as before.

Knock out the pins that keep the stripping plates together, remove the followers, dress off outsides on planer, and dress off inside where followers work up and down, enough to have it work without too much friction. In the cope plate I use pins, having a taper so as to drive them up and take care of natural wear. In the nowel plate I counterbore and put in bushings, the flask for this plate having tapered pins adjustable to take up natural wear. In the cope part of flask I have bushings, all pins and bushings being of hardened steel, as they are used thousands of times, and it pays to have something that will last.

In pouring stripping plates as described above they are bound to be exact, and no care to lay them out is required, if the pins fit as they should.

In fitting up patterns that do not require stripping plates, dowel pin holes and pins are used on the same principle and a perfect match is obtained with ease.

Some Notes on South African Foundries.

The roving disposition of the American molder has been much commented upon, and sometimes the recital of his inclination to hit the road has left anything but a favorable impression. After all is said against a wandering disposition, it must be acknowledged that nothing gives a molder experience like changing from one shop to another.

Among the many friends of THE FOUNDRY in all parts of the world, no one has probably had a more varied experience than Mr. James Cherrie, who is at present making his home in Glasgow, Scotland, the birthplace of many a fine mechanic in the molder's trade. Mr. Cherrie has worked in all parts of the world and is therefore enabled to make a just comparison between the condition of foundries in many different latitudes.

Just now much attention is focused upon South Africa, because of the present clash between the military forces of Great Britain and the republics of the Transvaal and Orange Free State. Mr. Cherrie's narration, giving his observations in that part of the earth, brings forth the old truth, applicable to the foundry business as well as everything else, that one-half of the world does not know how the other half lives. We will let Mr. Cherrie tell his story in his own words.

I had been feeling out of sorts for a long time, a six months' holiday in Glasgow did not seem to improve me, so for a change I took a trip to South Africa, leaving Southampton, England, at the end of January by the Union Mail steamer "Scott." To anyone having the time to spare and an inclination to travel, together with a desire to spend a pleasant holiday, I can recommend the trip. Three days out, you call at Funchal, Island of Madeira. As soon as the vessel drops anchor in the bay the natives are out in small boats giving you exhibitions of their ability in diving for money. At first they will not dive unless silver money is thrown in the water, but before leaving the beneficial effect of competition asserts itself, when they will dive from the deck of the steamer for a copper coin. It is a pretty sight to see them following the money under water, and in my opinion it appears as if it would be a difficult task to drown them. If you want to go ashore you must bargain with a Portuguese boatman, the officials of

the steamer advising you not to pay them until they return you to the steamer, and the wisdom of the advice is evident before you get back. The wines are cheap and the custom of the island is to freely sample before making a purchase. A good many delayed purchasing until they were too well filled to decide, when the boatman had to look after their return, and in some instances even had to carry them aboard, but after all one is sorry to leave, the time of stopping being much too short to thoroughly inspect the many points of interest.

It is such a pretty place, and everyone seems to be at ease. There is none of the hurry and rush so common in England and America. You see the sights seated in a sled drawn by oxen, and have a body guard of beggars and traders wishing to sell you all sorts of fruits, flowers and cigars. The island is one large flowerbed, flowers being everywhere. We had to leave the island pleased at seeing much in a short time and yet regretting that we were compelled to earn our own living in the rushing eddy of civilization.

For the next thirteen days you are sailing under cloudless skies with scarce a ripple on the water. We landed in Cape Town, the New York of South Africa, about midday. It was hot, January and February being the hottest months in that part of the earth. My first impression was that Cape Town must be a good place for molders, as every second or third man was wearing emery grinder goggles. On making inquiry about the goggles I was furnished the information that the Cape doctor was out to-day. I soon found that this meant that there existed a necessity for wearing goggles. Windstorms are quite common and the dust is like a fog. I was told the place would be unhealthy if it were not for these windstorms, so these are alluded to as the "Cape doctor." During my three weeks' stay there the storms got to be unbearable at times.

Cape Town has no works of any consequence. The five foundries put together would not make a decent shop. The principal work is in connection with buildings or in small repair work for steamers calling there. The custom of the shops is to fill the floors up and then put on the blast. The one I worked in, if they cast twice a week they were doing well. The shops are built with no regard for comfort or convenience, and have nothing to work with. If you can make your work all right and make plenty of it you may get along. I don't think any molder there cares whether he gets along or not, as there is no incentive to work. Wages are from $1.50 to $2.50 per day. Living is dear and very inferior. Six dollars per week is about the cheapest for board. Most of the boarding houses are on the hospital system, with cots for each boarder and only space enough left for a few chairs, and the owners are inclined to be a little independent. With three or four steamers calling each week, coming and going, there are always plenty of boarders.

I had an accident happen to my hand, and as I had to wait till it got well I decided to try my luck in Johannesburg. Johannesburg is 1,015 miles from Cape Town and the train completes the journey in 62 hours, the railway fare being $40. The baggage system is expensive for travelers; the trunk which I had carried free in my travels in America cost me $7.50 to take with me on this one trip. The cars are built on the English compartment system. At night your bed is made up by turning up the back of the seat, another one turns down from the roof, so that with the seat and everyone agreeable you have six fairly comfortable beds in the small compartment. The train leaves at nine a. m., and the next morning you are away from civilization, remaining so until you get to your destination. During the entire journey there is scarcely a blade of grass to be seen. It is a desolate country all the way up, the vision beholding nothing but rocks and dust. The few small towns one passes in the Orange Free State are the only places that break the monotony. Railway stations are few and one wonders what the stations are for when there is not a house to be seen. A drummer told us that they are put up so that the engineer can stop and have a chat, and sometimes the chat is prolonged for an hour. It was a relief when the train got to Johannesburg to see a town and a hotel. There are four foundries in town, the Old Rand, the Austral, the Clyde and the Vulcan, employing in all about one hundred molders in busy times. The foundrymen have not as yet seen the necessity of looking at the foundry as a place requiring light or ventilation, except in the Vulcan, and it seems wonderful that this place is doing so well. The Old Rand

foundry is a curiosity, their two cupolas looking like huge beer bottles. The shop is built of corrugated iron, the daylight entering through each end of the shop. They have a small hand traveling crane, the posts that hold it up being a little shaky and are only held in position with rope, and yet this shop casts pieces weighing as much as three tons. Their drying stove or core oven is out of doors, being a trench in the ground with a fire in one end and an old water pipe at the other for a chimney. The oven roof is made of loose sheets of corrugated iron, yet in spite of these apparent drawbacks and lack of appliances, this shop does the best business in the town, and the molders don't get time to get tired of one thing, as work is continually changing.

Needless to say, one can see strange ways of working here. Gear wheels, pipes and pulleys make up the principal work. Pattern wood is very expensive, as it all comes from Sweden, and in order to economize in this item they have got into the habit of using sweeps and core boxes. I don't think there is a gear wheel pattern over three feet in diameter in the town, all others being made in cores. All of this, however, is their business, and molders should not complain, although where wheels are to be made very often a pattern would be of better advantage. Pipes are made from skeleton patterns and copes fitted for the work are not provided, instead all molds are made with flat copes and sunk partings. The cores are generally made from a sand core box, the plan adopted is to level a bed and use a templet and sweep, to make the core of the proper shape. A heavy core arbor is made and put in the shape and sand built up high enough to sweep up the top of the core from the same templet. After the core is swept up the core box is dug away, and the core lifted on stools and finished.

The molding sand is very poor and nearly every mold for castings weighing more than over one hundred pounds has to be wet-blacked and skin dried, and when this is done it is like so much dust. One has to exercise extreme patience in setting the cores in a pipe mold. When you see your two-days' work in the cleaning shop you are ashamed, although you have worked the very best you know how. When there are six or eight pipes on the floor getting skin dried with soft coal for fuel and no ventilation to carry off the smoke, one begins to feel sorry he learned the trade. In some small castings where the molds are not dried, you will find it difficult to produce clean castings. No matter how well you may have finished your mold, you will find on looking at your casting that where you expected sharp corners is a lot of loose sand and a general ragged appearance all over. The reason is that after you have closed up your work the industrious ant has been helping you. These insects are the plague of Africa to both farmer and molder and are in all new sands used in the foundries.

The heaviest castings made in Johannesburg are gear wheels of about six tons weight for the gold mines. But it is not for want of good molders that heavier work is not accomplished here, as you will find as good men there as anywhere else. It is cheaper to send to England for heavy castings if the time can be spared to wait for the shipment. Pig iron and coke have to be imported and duty is charged at 12½ to 15 per cent, bringing the price of iron to over $50 per ton. There is a Transvaal make of coke considerably cheaper than the imported article, but the first order is generally the last, as you have to drop the bottom before the shop is all cast. The Vulcan foundry—Thos. Begbie & Co., Ltd.—have built a large new foundry, and likely in the near future the others will have to look to improvements and facilities for doing work cheaper. It was my pleasure to occasionally go into this shop and note the improvements and better conditions under which the men work, which includes plenty of light and room, and everything to work with in abundance. They have a ten-ton traveling crane and in a short time they are going to change it to electric power. Their machine shop is newly fitted with electric power, and the foundry is next in order for the change. A short time ago they put in a gear molding machine, the first in Africa. This foundry is in charge of Mr. Rowe, an Australian, a practical, up-to-date mechanic, and one that has an eye to the interests of the firm and the comforts of the molders as well. With the exception of the Old Rand Foundry, the other shops use an English patent cupola, with large receivers for collecting the metal. There is a cupola in a neighboring state put up on the ideas of the general manager, the heaviest casting they

have made weighing a little over a ton. The improvement he has devised consists in the tuyere pipes being located sixty inches above the bed. The foreman wanted to change the design, but could not convince the manager where the change would be of any advantage.

Molders' wages in Johannesburg are $5 per day, and in some cases more, the hours of labor being fifty-one hours per week. Work is unsteady. A breakdown at some of the mines may keep a shop busy for a few days, when men are hired to get it out fast, and then they are laid off. It is generally night and day until a breakdown job is finished. Overtime is paid for at the rate of time and a half, with double time for Sunday work. I am sorry to say that Johannesburg is troubled with a good many molders who have a bad thirst, and when trade is at its best the trouble gets to be a real affliction.

The laboring work is done by the native Kaffir races, and here one meets with more trials until he acquires some knowledge of the native's language. In my opinion all that can be said in the native's favor is that he is cheap. Some are good workers and the majority of them can riddle sand and carry iron, outside of that they are of little account. The native is paid at the rate of $15 per month and gets his food, which is a porridge made of mealy meal (mealy meal is sweet corn ground). Sometimes he gets a change of diet when the corn is boiled whole. He is happy and contented, has neither toothache or headache; he is very saving in his habits and looks forward to the time when he can go home to his kraal and purchase one or more wives to do the farming work. His stupidity is sometimes amusing, as is shown, when six or eight are carrying up iron and scrap to the cupola, each with a sack of it on his back, some going up, others coming down; should they meet on the middle of the stairs they will stop and debate as to who has the right of way.

It was at Crowdy & Co.'s foundry at Krugersdorp that I saw the Kaffir worked to advantage. In getting the iron up to the cupola, sacks were filled to as near 100 lbs. as possible, a post projected from the roof with a pulley and rope attached to it, the Kaffir fastened the rope to the sack and went up on the roof, catching hold of the rope, jumped, and as he went down the sack went up.

When the iron is being melted the native generally takes off his shoes for fear they will get burned, and will walk across hot scrap with his bare feet as if it were nothing to him, and carrying all the metal till the pouring is finished. One shop keeps the molders at work until quitting time, the foreman and the Kaffirs doing the casting. It is a saving one way, but a great loss to the firm as this class of labor spoils a lot of work in pouring. After the work of the day is over, the native can roll himself in his blanket and sleep soundly on the sand heap until next morning. Some are very fond of whiskey, although the saloons are not allowed to sell to them, making him all the more anxious to get it for he loves to imitate the white man. He smokes a good deal and enjoys a strong cigar, smoking it with the lighted end in his mouth. His principal enjoyment is his war dance. At short intervals there are dances at various places and they collect sometimes in crowds of a thousand or more. It is a sight long to be remembered; they dance in groups of about one hundred at a time and keep at it till they are exhausted, when another fresh company takes their place. They get music from a drum made from an empty tar barrel with a skin stretched tightly over the top, and the one that drums the fastest is the best player. They are dressed in anything from a handkerchief to an overcoat. They are fond of jewelry and wear lots of bracelets and anklets made from copper or brass wire. Some have the rim of their ear cut, all using their own choice of ornaments —copper wire, safety pins, bone snuff spoons, and one I noticed has a cigar as an ear jewel.

You cannot afford to treat the native kindly, if you say anything to him or pass a joke he takes it as an evidence of weakness and will impose on you as much as he can, and expect you to keep him in clothing and tobacco for the help he is paid for. He is no great judge of character and ofttimes mistakes his man, and feels sorry for it.

There is a plentiful supply of white unskilled labor which can be had cheap and why the stupid Kaffir gets the preference is a question I cannot understand.

Very few molders have their families in Johannesburg. It is a foreign country to the English-speaking race, with very poor education facilities for children, and the moral tone of the town is not of the highest

order. House rent runs from $30 to $50 per month, and the cost of living is high, boarding generally costing $10 per week; clothing, boots and shoes are more than double American prices. There are no sanitary arrangements and smallpox and typhoid fever are prevalent. You often see a poor Kaffir sitting at a street corner covered with smallpox, a Dutch policeman standing at a distance warning the people to stand back until the ambulance wagon comes along to take him to the hospital.

Water is unsafe to drink and soda water costs 12 cents per glass; those who drink anything stronger might as well stay away. Books and magazines are very expensive, the evening papers costing 6 cents each. The only article I found reasonable was tobacco at 50 cents per lb., grown by the Boer farmer. Gas light is scarce. Kerosene oil is very expensive, and if you cannot afford to live in a good hotel you have to read by candle light.

The name of Africa is associated with heat in most people's mind, but you can get cold in Johannesburg that feels as bad as in America. The frost is not so severe, but it has a wind that can go clean through you. Summer heat is not excessive, and no matter how hot it is during the day a blanket feels comfortable at night. No rain falls from May till October, and the wind can collect such a lot of dust that you will find walking backards a necessity at times. Outside the town is barren veldt, with not a blade of green grass, and in some directions as far as the eye can carry, you cannot see a tree. Nothing can give one the blues faster than to go for a walk in the country. The Transvaal government at the present time has an eight-hour per day bill under consideration, and no doubt it will pass, and as soon as this little trouble is settled the country will be a better place to work in.

President Kruger, with all his faults, real and imaginary, is the friend of the working classes who are slowly realizing it, but it has taken them a long time to do so. They would rather listen to the agents of the gold mines, telling them they have grievances against the government, and at the same time suffer reduction in wages, or have the hours of labor increased. I have yet to find the workingman who wants the franchise, and the privilege of becoming a citizen. From incidents that happened while I was there, and with which I am thoroughly acquainted, I am lead to wonder if correspondents to the English newspapers are lying at increased rates of pay. Nearly all the mechanics have left until the trouble is over. In Cape Colony or Natal they will have to work for half wages, and living will be very little cheaper at that. Perhaps the sight of the British flag will be worth the loss of $2.50 per day.

A Cupola Chat.

BY CHARLES BUTTERFIELD.

Mr. Jewett's criticism of the small cupola is just. There is nothing more aggravating than to have to run a long heat in a small cupola. Most founders seem to overlook the fact that even if it is possible to keep a cupola in operation for several hours, it is not by any means economy to do so.

In the first place, no molder can work with any satisfaction to himself once the wind is put on. Whenever he is forced to do so the result is as unsatisfactory to his employer. It is always a good thing to have a cupola too large. It is easy enough to make it smaller, while it cannot be enlarged beyond a certain size.

In the second place, aside from the loss to the employer in the length of time the molders must wait for the heat to be completed, there is another distinct disadvantage which I doubt but few foundries take into consideration when they install a small cupola.

As is well known, a cupola becomes clogged after a certain length of time. The lining burns out and adds a certain amount of slag to that made by the ash of the fuel and the impurities of the iron. What we term the burning of the lining is accomplished when the heat reaches such a degree that it melts the fire brick. It does not take much figuring to prove that the longer a cupola is kept in blast, the hotter the fire brick becomes and the quicker are they worn or melted away. In other words, there is a greater wear and tear on a cupola lining by keeping it in blast three hours continuously than by melting three heats of one hour's duration each. It is a common experience that cupolas will melt satisfactorily for the first hour, this is more especially the case with those of smaller diameter, but afterwards the iron will lose the sharpness it had at the start.

A double lining is always to be preferred, because a lining will burn out a certain amount anyhow, and with little care retain this position when once found. This it cannot be permitted to do with a single lining, because the hollow at the melting point would leave too little protection for the shell.

Mr. Jewett's advice to place tuyeres from 18 to 30 inches above bottom doors, depending upon size of cupola, is susceptible of modification. Briefly stated, the tuyeres of a cupola should be located as low as possible. For a shop doing light work, where all the iron is carried away in hand ladles as fast as melted, four inches above sand bottom would be plenty high enough. For a shop doing jobbing or heavy work, where considerable time is required to change ladles, three or four times that distance may be needed.

The fuel in the bottom of a cupola performs no office beyond supporting the burden above it. It imparts no heat whatever to the metal, and the latter loses fluidity continuously from the very moment it leaves the melting zone. The sooner iron is drawn from a cupola the hotter it will be. For these reasons high tuyeres are not to be recommended unless local conditions make them necessary.

Operating a cupola or the melting of iron is probably a question that will always be open to argument, principally through the fact that no one has yet devised a transparent cupola or an X-ray apparatus through which we can observe its operation. I think it is the accepted theory, however, that a cupola can have but one melting point, or zone, and that this zone is at a variable height above the inlet of air or tuyeres, its location depending upon the volume and pressure of the blast, being generally conceded to be between 14 and 26 inches above the tuyeres.

In the sketch with which Mr. Jewett favors us in the October FOUNDRY there is shown a cupola having eight lower tuyeres, four inches in diameter and six upper tuyeres three inches in diameter. The area of the lower tuyeres is 101.7 square inches, that of the upper row 42.4 square inches. One effect of placing two rows of tuyeres in a cupola is to elevate the melting point. In other words, placing the upper row of tuyeres 18 inches above the lower row has practically the same effect as if the lower row of tuyeres were raised to the same height. In the cupola illustrated the melting zone is a certain distance above the UPPER row of tuyeres, and not a certain distance above the LOWER row.

I have called attention to these things because the design of a cupola with which Mr. Jewett has favored us will not melt a single pound of iron. The author says that two of these have been built and work well, but I will bet a ten dollar suit of clothes against a postage stamp, that either they were built from a different design, or else they don't work at all.

Mr. Jewett shows us very plainly in his illustration that he charges his bed of fuel to a height of between eighteen and twenty-three inches above the lower row of tuyeres. This brings his pig iron and scrap directly opposite the upper row of tuyeres. Now, I will guarantee any man that he will not melt an ounce of iron at this point if cold air is blown in through the 42.4 square inches of opening made by the six 3-inch tuyeres which Mr. Jewett shows ready for business.

If Mr. Jewett had shown the bed of fuel changed to a height of 18 inches above the upper row of tuyeres he would have shown us something that would at least melt iron, although I am convinced that for nine foundries out to ten the lower row of tuyeres is placed too high. The upper row is also placed too high above the lower row for all kinds of foundries.

I further believe that whatever benefit Mr. Jewett gains in more complete combustion by placing the upper row of tuyeres at this height is more than lost in the extra amount of fuel which must be maintained below the tuyeres. Neither does it appear to me that it would be necessary to have the upper tuyeres contain forty per cent of the area of the lower tuyeres simply to secure a more complete combustion. I say more, because in a cupola, combustion is never really complete.

Letting the height above bottom doors be twelve feet, as shown, lower tuyeres 26 inches above bottom, upper tuyeres 20 inches above bottom tuyeres and the melting zone 18 inches above the latter, we have, allowing for the space occupied by the two tuyeres, only a distance of six feet and seven inches between the melting zone and

bottom of charging door. If I had a cupola of the design shown I would stop up the upper tuyeres altogether and increase the size of the lower ones, if necessary. These I would place about ten inches above the bottom doors and allowing eighteen inches above the tuyeres for the melting zone. I would have nine feet between this and the bottom of the charging door, against six feet and seven inches in Mr. Jewett's design. If I could not obtain more real economy in having the hot gases pass through the extra amount of iron I could thus put in the cupola and in the saving of fuel I would make below the tuyeres, I should very much miss my guess.

Mr. Jewett's idea of measuring the fuel in the bed with a gauge, so as to have it come to the proper height, is one that I approve of in every particular. There is only one thing to be looked after in this connection, and this is, that the kindling wood is consumed before the bed is finally measured up. Dull iron results if this is not done. Many foundries have poor heats because they place too much coke on top of the kindling wood in the first place, thus depriving it of a chance to burn out quickly. About half the amount of coke usually put on the bed is enough to put on the kindling wood for a starter, and will give a better draft. When the smoke has disappeared the balance can be put in with the assurance that the bed of fuel is in the right condition.

The sand bottom of the cupola shown by Mr. Jewett has too much fall and will cause the metal to rush out with unnecessary velocity. Neither is there any valid reason why the spout should be dipped downwards to the extent it is. The design shown of an upper tuyere is bad all the way through on general principles. As a man cannot see around a corner, he will not be able to look through these swan-neck shaped tuyeres, and without any opening they will be found difficult to clean when they become clogged. Besides, tuyeres of the design shown cost considerable for patterns, core boxes and molding, without in any way being any better than simpler designs. As Mr. Jewett showed his design for the benefit of those intending to build their own cupolas, he should certainly have kept this fancy tuyere in the background.

Other Ways of Working.

By EZRA ESTEP.

A great deal of attention is being paid to devising appliances that shall not only take away from the molder some of his more tedious work, but shall also at the same time improve the quality of his product.

I will describe a method of molding a casting, the pattern of which as ordinarily made is difficult to draw from the sand. It is a simple casting, comparatively; one of those plain jobs that if properly made gives good returns, but if done without suitable appliances unsatisfactory results are likely to follow. The machine illustrated is not, strictly speaking, a molding machine, as all the ramming is done by hand. The mechanical part of the machine comes in when the pattern is to be drawn, which in this case is accomplished through the medium of a stripping plate, a set of patterns, in this case four, being drawn at the same time.

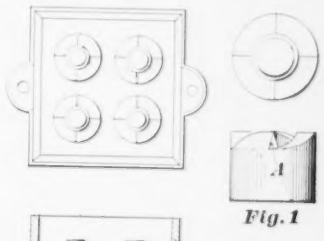


Fig. 1

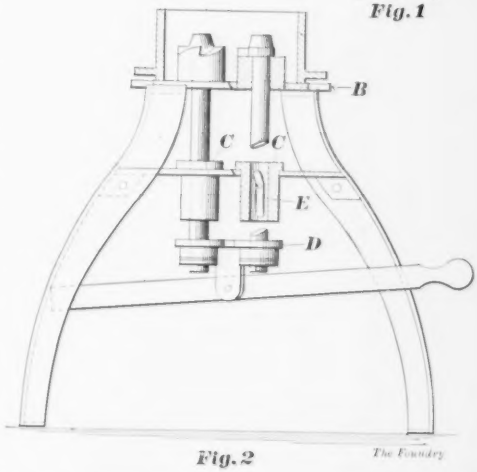


Fig. 2

Fig. 1 represents a plain four-toothed clutch, having back draft on the face side of the tooth, as shown at A. When we first started to make these castings we had great difficulty in drawing these patterns by hand, as the tooth, being in the bottom of the mold, could not be seen until the pattern had

left the mold. Even if no apparent damage was done to the mold in drawing the pattern, it was often found that the corners would be loosened without showing any visible cracks, the result being that a great many castings were lost from the washing away of these portions of the mold. With the machine illustrated, however, we have overcome all these difficulties in molding these castings, which, by the way, have to be perfect in every detail. We have bettered our product, and at the same time accomplished a saving in labor.

Fig. 2 represents partial plan and elevation of this machine, some portions being shown in section in order that the reader may obtain a better view of the different parts. B is the bed plate of the machine, with holes for the four patterns bored so that these can be drawn through with ease, the patterns being mounted on shafts long enough to extend through the collars C on a spider bolted to the legs of the machine. The lower end fits loose in hubs on draw plate D, and is secured with washer and pin underneath in such a manner that the pattern and shaft is free to turn in both bed plate B and draw plate D. The collars C are bored, turned and fastened to the spider and are fitted centrally with holes in bed plate. They have a diagonal slot E, cut in one side, into which fits a short pin attached to the shaft.

When the pattern is being drawn, the pin follows the diagonal motion of the slot and gives the patterns the necessary twist to permit them of clearing the back-draft of the teeth, thus insuring a perfect mold at each operation. The handle through which the molder operates the machine is placed as shown to be within convenient reach.

The cope part of the pattern is a plain, straight plate except for the four core prints. The principle here illustrated can be utilized in the molding of all castings, the patterns of which must be removed from the mold with a twisting motion.

Cement for Fastening Wood to Cast Iron.

A correspondent recently asked the American Machinist for a formula of cement which would answer in many kinds of pattern work, where wood and iron must be joined together. The following reply is given:

A cement recommended for fastening wood to iron is made by dissolving glue in boiling water, making it of the consistence of cabinet-maker's glue, and then, while stirring, add a sufficient quantity of wood ashes to produce a mixture resembling varnish. The surfaces to be united are heated and covered with this cement and allowed to cool. We doubt, however, if this cement will prove entirely satisfactory for pattern work unless it is supplemented by some form of fastening, such as screws or dowel-pins.

Overheard in the Foundry.

Bench Molder—"Shure, d'the boss is kickin' agin."

Chum—"What's he kickin' about now?"

Bench Molder—"Yisterdy he said Oi overrapped me wurruk, an' now he say me castin's is too rough."

Chum—"Well, what did you say?"

Bench Molder—"Shure, Oi axed 'im wud he have me be makin' sthim windin' watches next?"

Cast Iron Dies.

We have made many dies of cast iron for bending and forging wrought iron and steel, and where the corners are not required to be too sharp had very good results. We cast the dies for drop hammer or press with the tongues solid, so that all is in one piece. The part I wish to call particular attention to, however, is that we are using a very hard iron for grinder burrs and work of that kind, and when we want a die to last we cast it in the hard metal, but to do so we must have the pattern correct to size and smooth, as no filing can be done on this hard iron. These dies last to do an immense amount of hard forging and bending.

We have one bending form for a steel crank of 1-inch round steel with sixteen bends. The form is part cast and part steel. The steel corners always give out first. The hard metal lasts much longer and gives better results, as the hot steel does not soften it; but the steel pieces on the form soon get so soft that they bruise easily and get out of shape, so they have to be renewed often.—Ezra Estep, in American Machinist.

Loss of Cast Iron in Melting.

It is estimated that from two and a half to four per cent of pig iron is lost in melting, heavy machinery scrap losing an equal amount and stove scrap from ten to thirteen per cent.

THE FOUNDRY

Published Monthly by

THE FOUNDRY PUBLISHING CO.

DETROIT, MICH.

JOHN A. PENTON, - - - EDITOR.

SUBSCRIPTION PRICE:

$1.00 a year in advance, postage prepaid in the United States, Canada and Mexico.

$1.75 a year to other countries, postage prepaid. Single Copies, 15 Cents.

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The Detroit News Co. will supply the trade with THE FOUNDRY, through the regular channels of the American News Co.

We want to obtain examples of current foundry practice. Photographs, drawings and descriptive matter, showing just what is being accomplished in the foundries of to-day, will be cheerfully paid for.

We can not furnish a continuous set of back numbers beyond March, 1899.

Entered at the Post Office at Detroit, Mich., as second-class matter.

Trade Outlook.

With oversold conditions prevailing at many furnaces, foundrymen can have but little hope of lower figures for pig iron for some time to come. As long as premiums are offered for early delivery of irons, the stock on hand will certainly not accumulate. The scarcity of high silicon iron is being seriously felt in some foundries doing light work, and more or less complaint is heard from customers who do not find their castings of the usual softness.

The low prices of past years for pig iron may rule again, but that they will do so in the immediate future is made impossible by advances in the cost of ore, freight charges limestone, coke and labor which have gradually taken place and which bring the cost of producing pig iron up several dollars a ton. It is also to be observed that even a slight reduction in prices would bring forward an immense amount of reserve orders whcih are now only held back by what appears to be inflated prices.

Labor disturbances have been quite frequent, but with shops full of orders there has been a disposition on the part of the employer to concede the demands made upon him as far as possible. With one or two exceptions but slight stoppages have occurred from this source, a willingness on the employees' part to meet their employers half way in most instances resulting in immediate settlement.

A Big Scheme.

Considerable space has lately been given to the doings of one John W. Baker, of Philadelphia, who is said to hold options on 118 stove manufacturing plants out of a total number of 218, with promises of an even half hundred more to tell just at what figure they would be willing to let go.

Looking at the number of plants involved, this is probably the largest attempted consolidation of all. It is almost impossible to conceive of such an aggregation of individual plants being operated by one management, and whether this can be done is history yet to be written.

Great stress is laid upon the saving this combination would make in designs and pattern-making. There is no doubt a saving can be made in this respect by the use of fewer patterns; the question is rather whether this sort of economy would redound to the credit of those who carried it into execution.

It should at the outset be borne in mind that the design of a stove is not subject to being standardized like steel rails, machine screws and gas pipe. A stove is a good deal like a baby carriage, a suit of clothes or a house; some people like one design, some another, and between them the manufacturer, tailor and architect are kept hustling to invent new designs which shall meet the popular fancy.

If a standard pattern of stove could be adopted by the proposed consolidation, it would also follow that each stove manufacturer could make a standard of his own and stick to it. Yet we know they are not doing so, nor even trying to, simply because the purchasing public will refuse to be bound by standards and insist upon having a variety to select from. It is one thing sure that if any combination of stove manufacturers refuse to get up designs to meet public favor, some one outside of it will be willing. A stove is the wrong article to standardize.

Why Should Foundries Not Consolidate?

The ultimate benefit of consolidation by a number of plants engaged in the same line of industry has never been questioned, when this has been done wisely and justly. By this we mean consolidation where watered stock has been absent and where the management of the combined plants has been vested in men selected for their practical training, and not on account of favorable family connections with large stockholders.

Carried to its logical conclusion, consolidation means a better product at a less cost to the consumer, and a greater profit to the producer. The cost of marketing a product is something that the average workman has always failed to consider. His common school education may have enabled him to arrive at a fairly correct estimate as to cost of manufacturing, but it is very seldom indeed that we find an employe who also takes account of the cost of selling.

It is obvious that one large foundry, employing say a hundred molders, can be operated more economically than ten foundries employing ten molders each. Two cupolas and blowers will do the work of ten. Two foremen with a general superintendent will take the place of ten men at individual plants. Better equipment can be placed in the larger plant at less than half the outlay for the smaller plants. Added to the other economical features of the larger shop is the fact that it is much easier to find one good foreman than ten, for as far as ability is concerned it takes as much of this to turn out good work in a smaller shop as in a larger one, and if anything, more.

So far, consolidations, touching the foundry business, have confined themselves to certain parts of the trade where specialties cover the majority of the output. The American Car & Foundry Co. represents one line of foundry work, the United States Cast Iron Pipe & Foundry Co. another. The Central Foundry Co. was organized a short time ago and confines itself to the soil pipe interests. Many concerns, who made soil pipes as a side line, disposed of this part of their business to the Central Foundry Co., receiving a fair return for their outlay in flasks and patterns.

Taking the latter concern for an illustration, it is evident that they will be able to manufacture soil pipe and place this product on the market at a less cost that the great number of individual concerns. Some complaint has been raised in badly located towns that consolidations closed down certain plants and deprived its population of their usual livelihood. Such phases of industrial mobilization does not mean that anyone is deprived of a chance to earn a living. They mean simply that a rearrangement of working forces is taking place. The best plants are operated to the fullest extent and the operatives of abandoned plants find ready re-employment in the former.

We find scattered throughout this broad land of ours plenty of silent and decaying factories which bear silent evidence to the fact that the present is not the first time that people have had to abandon artificial for natural advantages. Whether this be woolen mills in Michigan, blast furnaces in the interior of New York or foundries in Kansas, the same bitter pill of experience is there, somebody tried to do the wrong thing in the wrong place.

So far as consolidations affecting the foundry trade are concerned, these have confined themselves to special lines, but the question may well be asked: If it pays these special lines to concentrate, why should not the same hold good with the jobbing shops? If two radiator shops can be operated to better advantage under one management, why should not the same principle hold good with two jobbing foundries?

There are any number of medium sized towns where two foundries are doing practically the same class of work, and where each has just about half enough to do. There is no mathematical reasoning to disprove that by disposing of one shop and operating the other to its full capacity, a better and more uniform product could not be obtained at a lessened cost.

It is true that individual management has much more to do with the success of a jobbing shop than with one operating on special lines, but it is also true that the same individual ability will assert itself when called upon to do so in a larger sphere. Nothing is more certain than that two foundries controlling a specified territory would be able to still better retain possession of same by combining their interests.

Krank's Korner.

Down in staid Philadelphia they have been talking about good molders, the scarc-

ity of them, how to make them and how to keep them.

Some people are in the habit of grabbing hold of these questions when there is not much of anything else to talk about. It is a wonder what a lot of words can be gotten out of a subject when nobody wants it answered the right way.

I can't see why questions like these should be solved in algebra. The shortest distance between two points is a straight line. I have got a straight line rule for getting good molders. It is as plain as that two and two are four.

* * *

If you want a molder that is good for one job, keep him on one job. Don't let him waste his time monkeying with anything else.

If you want a molder that is good for two jobs, so that you can change him from one to the other, why, just let him see-saw between the two. If you want him to be experienced on three or more jobs, let him go from one to another. In this way you will get good molders, who can do all the way from one job up.

Molders are made. They are not born like poets and opera singers. They are the product of years of experience, and experience does not in a general sense mean to keep a man as long as possible on one job.

All this talk about a lack of skilled molders is simply a reflection of the policy to keep men working on one thing.

Now for the question, how to keep good molders once they are made. Some foundries can turn out good men, but can't hold them a month after their apprenticeship expires. I know how I would keep these same boys—wouldn't lose a one of them.

I have shown that the way to make good molders is to have good work and a competent foreman to show them how to make it. The way to keep a good molder is to treat him better and to pay him a higher rate of wages than any one else is willing to do. There is absolutely no trick about this. A man always changes with the object of bettering himself.

* * *

All that has been done in modern shops in the way of improved systems of heating and lighting, better sanitary conditions, wash rooms and the like, is duly appreciated, but I think one speaker let his enthusiasm boil over when he made the prophecy that our molders would soon be coming out of the shops looking like bank clerks. He might as well have said that a person working outdoors would not get sun-burnt.

I believe this kind of talk is something that, for want of a better word, may be called over-education. I am afraid if the speaker was asked to pay his molders enough wages to afford them a chance to dress like bank clerks that he would promptly refuse. There is something ridiculous about the after-dinner speeches made by men who ought to know something about the foundry business. We may see some mighty good times, but it will be many a day before our molders will wear dress suits seven days in the week. An imaginary picture of such a scene makes me laugh.

* * *

Does it pay to pickle ordinary castings? was one of the questions which came up at a recent meeting of the American Society of Mechanical Engineers. A certain acid was mentioned as being very effective, and the sand blast was recommended as superior to pickling.

It does not pay to do either unless the castings are too weak to be cleaned otherwise. The cheapest way of all is to shove them into a tumbling barrel along with some hard iron stars or some cinders from the cupola if nothing better is at hand. Even exceptionally light castings may be tumbled if care is taken in providing the right kind of tumbling barrels, that is, some of small capacity. There is less danger of breakage with a small tumbler than a large one as the weight of its contents will be less and will decrease the strain caused by this weight falling with less force than in a large tumbler. Careful packing of the castings and a few pieces of boards placed in the rattler will enable one to clean surprisingly light castings by this method.

* * *

I am a strong believer in the object lesson that comes from the plain man in the shop. His spelling may not be what it should, but the principle of practicability is there and the editor can set the words right, at least that is what he is supposed to do. I believe good plain English furnishes the best means for transferring the idea of one man to the mind of another.

I don't believe there is anything to be gained by butchering the language in attempting a humorous orthographic spelling.

When I read the word foundry spelled as fowndry or founderry and the rest of an article meant to be an object lesson purposely mutilated in the same manner, somehow the points it is meant to emphasize are lost upon me, while I am trying to find out just what it would mean if written right. Such specimens of educated illiteracy have their place, which is not in trade journals, where common sense, business and plain language will do the most good.

Coming Back at the Krank.

Editor THE FOUNDRY:

In your October number "The Krank's Korner" has gone to considerable trouble to ridicule, amongst a number of others, a very modest advertisement of our own, and as there are two sides to all questions, we will give you the outlook from our point of view. "Castings" are not clothing, dry goods, patent medicines, biscuits, or soap, nor are the people we are trying to reach the people who would be influenced in the least by such advertisements as "Honest John" puts forth.

The people we want to sell are not "Kranks" (we get plenty of them without advertising), they know what castings are, and what they want, and each one has his own ideas as to what suits his requirements best, and usually "specifications" as to what that requirement is, all of which has to be developed when you find out that he does want "Castings," and that is all we thought to do by the ad. "Krank" criticises—tell people we were making "Castings" and if they wanted "Castings" we would be pleased to hear what their requirements were, and when we found that out we could tell them what our advantages were for supplying such requirements.

All the ads. "Krank" finds fault with are in the same line; that is, they advertise they are melting iron to be put into anything cast iron is suitable for. They are not making stoves, hollow-ware, hardware, or anything of that sort, and they don't have "job lots" of castings that were sold last week for four cents and will sell this week at three and a half cents, nor do they get in an "extra fine lot" of pig iron, and are therefore prepared to make better castings than heretofore or than anyone else in the trade.

Business is very much the same no matter what line you are in, but it differs largely in detail, and that is just where, in our opinion, "Krank" gets "off."

He may have served an apprenticeship in the advertising department of a patent medicine house, or with "Jiggle Whooper & Co.'s" department stores, but we would like to see him impressing the buyer for some large machine shop, the architect in charge of erection of a twenty story building or even the Ordnance Department of the army, with such ads. as "Pear's Soap," "Uneeda Biscuit," or "Honest John" get up.

We agree with him that "advertising has made fortunes," but we differ as to what "advertising" is in the special line of the foundry business that he has seen fit to take up.

STUART R. CARR & CO.

Baltimore, Md.

A Great Company.

Every pig iron consumer is familiar with the name of the Tennessee Coal, Iron and Railroad Co., and the majority also know James Bowron, its genial vice-president and treasurer. In a recent contribution to the New Orleans Times-Democrat Mr. Bowron thus speaks of the corporation he represents:

I would seek to engrave one most startling and most telling fact upon the reader. Its significance is almost immeasurable; that, while the county of Durham, England, supplies the fuel for the blast furnaces in the north of England, both in the Cleveland and also in the Cumberland districts, 200 in number, yet the Tennessee Coal, Iron and Railroad Company owns more than threefold the area of coal lands that are known to exist in the county of Durham. The Iron and Coal Trades Review estimates the area of coal left available in that county as 93,000 acres, while the coal lands of the Tennessee Coal, Iron and Railroad Company exceed 300,000 acres. It owns 450,000 acres of land, of which 300,000 acres are coal, 70,000 acres brown ore, and 71,000 acres red iron ore. It owns twenty blast furnaces, with a daily capacity under normal circumstances of 3,500 tons of pig iron; it operates twenty-three collieries, with an aggregate daily output of 14,000 tons of coal; it possesses 3,550 coke ovens, with a daily capacity of 5,530 tons of coke; it employs 14,000 workmen and pays them in cash every month, to the last cent remaining due on the first day of that month.

The coal and iron ore lands of the company are so favorably situated that the iron ore and the coke to smelt it are economically brought together, a great saving in transportation being effected. It is this marvelous contiguity of materials which has enabled the State of Alabama to obtain its prominence of to-day; and what is that prominence? It is that which appertains to a producer of a cheap every-day article like pig iron at a figure that will enable it to be laid down in every State and Territory of the United States, in Canada and Mexico, in England, Scotland, and Ireland, in France, Belgium, and Holland, up the cold waters of the Baltic to Sweden and Finland, up the green waters of the Rhine to Germany and Switzerland, and down the blue waters and under the blue skies of the Mediterranean to Spain, Southern France, Italy, and Austria, and furthermore, across the equator, and around the Horn, or past the Cape, to Japan, China, and India.

This remarkable company, whose stock was at 17 when Dewey smote the Spanish fleet, and is now in the 90s, produces more coal and more pig iron than all the other coal producers and iron producers in the State of Alabama combined, so that it has no "rival" in the South.

It supplies such systems as the Louisville and Nashville, the Southern, the Alabama Great Southern, the Illinois Central, the Mobile and Ohio, the Southern Pacific, the Texas Pacific, and scores of smaller railroads with their fuel for the movement of trains; steamships at New Orleans, Pensacola, Mobile, Charleston, and Port Royal get their bunker supplies from it; railroads in Mexico bring its black diamonds by barge from Pensacola or Mobile; other blast furnaces owe their existence sometimes to its surplus coke product beyond its own requirements; and rolling mills and foundries, cotton mills and woolen mills, oil mills, gas works, and waterworks, from Nashville, Tenn., to New Orleans, inclusive, always rely upon the supplies of coal from this great corporation, so as to insure the regular operation of their works. Its iron product goes everywhere. The cast iron pipe foundries of Bessemer, Anniston, Cincinnati, Louisville, and Philadelphia; the soil pipe foundries from Gadsden and Baltimore to Milwaukee and New York; the enameled bath tubs of New York City and of Louisville; the stoves of Detroit, St. Louis, and Keokuk, of Albany and Troy; the radiators of Chicago; the car castings of Pullman, Jeffersonville, and Michigan City; the bar iron of Brazil, Ind., and Terre Haute and Muncie, and Harrisburg, Pa., are leading exponents of the universality of its sales, whilst its basic metal, sold on a guaranteed analysis for steel making, goes to the steel works in Pittsburg, Chicago, Cleveland, St. Louis, Muncie, Elmira, Pencoyd, Germany, Russia, and Italy. Who can follow its use from these points?—ship plates, bridge material, structural steel, stamped and enameled ware, tinplates, and possibly into armor plates.

The steel works at Ensley, owned by the company, are undoubtedly the finest in the world, and have just been visited by gentlemen from England, who came to inspect them before building theirs. No money has been stinted to obtain the most modern and complete arrangements and equipment that engineering science could devise and supply. The product will be 1,500 tons in every twenty-four hours of basic open-hearth billets or slabs at the outset, and rails will be produced a little later on. Sales of many thousand tons of these steel billets have been made in advance at Pittsburg and Chicago, but it is expected to supply chiefly the Birmingham trade and to export the surplus, utilizing for this purpose the opportunity presented by daily sailings of corn and cotton ships from Southern ports to European destinations, nearly all of which, especially the cotton ships, are in need of heavy material as a stiffening and will take it at a low freight.

The company has no politics. It maintains no lobby. Its officers embrace Republicans and Democrats, goldbugs and silver-loons, free traders and protectionists. The results obtained by this company are attributable to three things:

1. The inherent value of the mineral property, which can not be duplicated as to extent, quality, and propinquity in the world.

2. The fixed policy of its officers to attend to the company's own business and let other people's business alone.

3. The civil service or merit system of promotion, which strains out poor men, and has in the course of years, gathered around the administration a staff of officers and men of unrivaled competency. Industry, ability, and

integrity are the only three requirements of the company at the hands of its employes. What has been the result accomplished? Simply this: Twenty years ago the company had a capital, counting bonds and stocks together, of $700,000, and was working 500 men, with an output of 1,000 tons per day of coal and 300 tons of coke. It was scarcely known beyond the county in which it was operated and the city of Nashville, Tenn., to which its coal was mainly shipped.

To-day, with a bonded and stock capital aggregating $30,000,000, with over 14,000 employes on its pay rolls, with a daily output of 14,000 tons of coal, 3,500 tons of coke, and 2,500 tons of pig iron, and an approaching output of 1,500 tons per day of steel, it absolutely controls the prices of foundry iron for the entire world, putting them up or putting them down. When it moves in this direction others must move, and its securities have become known on half the bourses of Europe.

Two Views of Phosphor Bronze.

In the Aluminum World for August, Mr. G. H. Clamer, chemist of the Ajax Metal Co., of Philadelphia, expresses his views on this metal as follows:

Standard phosphor bronze is an alloy of copper, tin and lead, containing phosphorus, and has been in use as a bearing metal for upwards of twenty-five years. The addition of phosphorus, it is claimed, adds to the fluidity of the metals by lowering the melting point, and so producing sound castings, without a very great expense of heat in the furnace. That phorphorus adds this very desirable property is unquestionable, but in attaining this virtue a great and serious evil creeps in. The phosphorus in the alloy does not distribute itself evenly throughout the mass, but is localized in that part of the alloy which is called the eutectic or most fusible part of the alloy—the part which solidifies last. Phosphorus modifies to a great extent the hardness of the eutectic particles of the alloy, thus forming hard spots to create friction, and it is for this reason that phosphor bronze is never equal in service to an alloy like the Ajax metal, which consists simply of copper, tin and lead, thoroughly deoxidized, without leaving in the metal any injurious material, and at the same time having its constituents—the lead particularly—thoroughly and evenly distributed.

Phosphorus is no doube a great deoxidizer, but it is a very frequent occurrence to find phosphor-bronze brasses discolored by oxide on the fracture from end to end. Not long since a foundryman, in a foundry of one of the principal railroads using phosphor bronze, told the writer he undertook to break 100 brasses, made according to standard specifications, and found 75 per cent showed oxide spots. How is this accounted for? Simply by the fact that the phosphorus does not reach every particle of the metal, but is, as I said before, localized in the eutectic. Apart from this defect, the metal is much harder to finish in the shops and is more expensive than the simple copper, tin and lead mixture, and deteriorates in remelting by the crystallization of phosphides within the alloy. Railroad men are beginning to recognize these facts, and phosphor bronze is gradually losing its prestige, and being replaced by the more desirable alloy produced without the aid of phosphorus. The Ajax Metal Company, manufacturers of Ajax Bearing Metal, are large producers of phosphor bronze, but they do not recommend it to their patrons for the reasons above explained.

Commenting on the above the Damascus Bronze Co. of Pittsburg, say in the September issue of the same journal:

We beg to say that when phosphor bronze is made from all new material, such as copper, tin, lead and phosphorus, and is chemically treated as that manufactured by the Damascus Bronze Company, it will never show any oxide spots, for the reason that the metal is at all times perfectly incorporated and the phosphorus uniformly distributed in every part of the bearing. This has been demonstrated more than a thousand times by the leading laboratories of the country.

We do not claim that phosphor bronze is the best bearing metal for railroad purposes, but we repeat that 70 per cent of the bearing metal used in this country to-day is phosphor bronze or phosphorized metals, and is recognized by the best mechanical engineers known. It is beyond question a high grade bearing metal when it is properly made, and it is growing more in favor every day. To prove this assertion we refer

you to the chemical works who manufacture phosphorus. Damascus bronze is composed of copper, tin and lead, and is chemically treated.

We, as metal manufacturers, claim that it takes different metals of different compositions to suit different bearing purposes, and this the Damascus Bronze Company has given a great deal of study to, and with wonderful success, having been rewarded by a large amount of patronage where the highest grade of metals are used.

Some Observations in a Malleable Shop.

BY AN IGNORANT MOLDER.

Not long ago I hit the road, my trip taking me over the Central Railroad of New Jersey, through the county of Northampton in the Lehigh Valley. Approaching a certain city, I noticed a tall stack from which there issued a flame, fully twenty feet in height. Knowing that some kind of a metallurgical operation must be going on, I sauntered over to the building and found it to be a malleable iron works. Asking for the foreman, who presented himself when he got good and ready, I inquired of this individual if he needed any molders, to which he replied that as a general rule he hired every bench molder that came along. He explained that their furnaces were not working to an advantage, producing very dull and sluggish metal, which dissatisfied the molders and made them quit their jobs, on account of the loss they sustained through mis-run castings.

When I asked the foreman as to the cause of the furnaces failing to produce a metal having sufficient heat, he, in a natural sort of a way, put the whole blame onto the furnaces. Not being able to tell me in just what particular they were at fault, I entered the shop, which is finely equipped in every way. Being permitted to look at the furnace and to observe its workings, I paid special attention to the way the metal was melted, which is the most important factor in producing malleable iron. I noticed that the furnaces were operated by a four-ounce blast and that the time required to melt a seven-ton heat was all the way from four and a half to seven hours, a period of sufficient duration to burn the iron. Looking into the fire-box, I ran across the source of all their troubles. The melter was keeping his fire to within five inches from the top of his front bridge. From this I knew the reason of the company's furnace stack being the town illuminator. Instead of the flame being used to combine the carbon and liquify the iron, it was passing right up the stack. I may be wrong in my opinion, but nevertheless I think that this foreman is incapable of running a sashweight foundry or a buckshot mill. The very fact that he would continue to run his shop in the manner here outlined proves that the company employing him might, with benefit, make a change. As it is now they have a standing advertisement in different papers for molders, whom they are unable to retain owing to the methods prevailing in the management of their shop.

CAST IRON NOTES.

Devoted to inquiries from Practical Foundrymen on the subject of Melting and using Cast Iron. Address all Inquiries to W. J. KEEP, care of The Foundry.

A GOOD COMPOSITION FOR SOFT CASTINGS.

"Please advise me through the columns of THE FOUNDRY the analysis of a good composition for fine gray iron (soft and strong) castings, also a list of desirable irons."

The letter head of the inquirer shows that he makes "superior gray and malleable iron, composition and steel castings. Small steel castings a specialty. Steel forgings to order." Gray iron is evidently of least consequence. I have answered this kind of question so often in these pages that it would seem that readers of THE FOUNDRY would be familiar with it. This is, however, the uppermost question with nearly all founders and I am afraid it always will be. If there was a given composition of cast iron that would give the best results in making gray iron castings, it would cause the pig irons entering into such composition to be in such demand that the price would advance beyond the reach of most, and would make miserable the lives of those who could not get them.

Fortunately, there will never be any such corner on any brands of pig iron. The founder will always be able to use the irons that are cheapest in his own market. The reason for this is that various compositions will produce exactly as good results as others, and that any composition can be varied by each founder to suit his individual purpose. Once in a while a chemist used to say that

he could formulate a chemical composition that would produce the best gray iron castings for a given purpose. Rarely two chemists will agree as to what such composition should be, for each man has had experience with a composition that suited his purpose, and because as I have just said various compositions will produce exactly as good results. Evidently the propounder of this question makes castings light in weight as well as in quantity. Any founder or any chemist who is familiar with this class of castings could name a composition that would make satisfactory castings, but another equally as good a composition might be more convenient in a different locality.

Suppose that I should say that carbon should be as high as 3.50 per cent with 3.10 graphite and 0.40 combined, but how is a founder going to know whether the iron that he can purchase contains this proportion? As there is no practical way for him to find out it is to be hoped that this will not affect his success as a founder. As a matter of fact, good dark gray pig will generally contain enough carbon and near enough in the right proportions. If the grain is uniform in size and open, it shows that the furnace was working well.

My advice to every founder is not to worry about the exact percentage of carbon but be guided by the appearance of the fracture of the pig. If the grain is close or irregular the founder should be careful until he finds whether this appearance shows that the iron needs some addition to make it suit his purpose. Once in a while an iron that has an open even dark grain may not make satisfactory castings, but farther on I will show how all such variations can be adjusted.

Suppose that I should say that phosphorus should be as high as 0.75 and no higher than 1.00 per cent, how can a founder find any exact percentage? Phosphorus somewhat prolongs the fluidity of melted iron, and gives a molder a chance to get hot iron into his mold, and 1.00 per cent will not weaken castings.

In most parts of the country pig irons will not contain this much and it is not necessary to search for irons containing more.

This means, don't think much about it. What about sulphur? Chemists and almost all say, now look out for this. However, you will not find it in good looking pig iron and you can purchase fuel that does not contain an excess of it. If you make light castings and have considerable remelt, sulphur in the casting will work up to 0.05 and sometimes as high as 0.07. Can you help it? If you cannot prevent it there is no use in worrying over it. I would rather not have it get into the castings and I do not know as sulphur does any good. All you can do is to be reasonably careful in the purchase of fuel.

You won't find much manganese in the pig iron; by much I mean over .75 per cent, and 0.50 will be nearer the average. You will never know that you have this amount in your castings. It is no trouble to keep manganese below 1.00 per cent, and in most cases you couldn't get it higher if you wanted to; so there is not much use to think about manganese. If you did know what percentage was best for your use there is no practical way for a founder to find the exact percentage of phosphorus, sulphur or manganese, either in the pig iron that he uses or in the castings that he makes.

If the man that you buy iron from is honest he will tell you what to expect. There is only one more thing in pig iron and that is silicon. I will not treat this as I have the other elements that are found in cast iron, because the presence of silicon turns combined carbon, the chief hardening element, into graphite, which is always in soft iron. Sulphur increases combined carbon and in that way hardens cast iron, but silicon by changing it back to graphite counteracts any evil influence of sulphur. Many conditions attending foundry operations increase the combined carbon, but silicon remedies the trouble.

If you ask me to give a definite percentage of silicon for any kind of castings, I must tell you that the amount needed depends upon how much influence of these foundry conditions, how much sulphur in the fuel, and how much combined carbon in the pig iron, has to be counteracted. I have said that it is not practicable for the founder to find the amount of these things to be counteracted and he cannot, therefore, tell exactly how much silicon to provide, but he must have enough and a little more will do no harm.

Now I am going to say over the thing that I always say, that the only practical way for a founder to put the correct amount of silicon in his casting is to measure the shrinkage of a test bar of any size he chooses to

make, but he must always use one size. The shrinkage is increased by too little carbon, by combined carbon, by sulphur, by manganese and by many foundry conditions, and such shrinkage is decreased by an increase of silicon. Therefore, by trial find out what the shrinkage of your test bar is at a time when the quality of your iron is satisfactory, and call that your standard.

If the shrinkage increases, increase your silicon. To increase it you must know from the one you purchased it from, which pig iron contains most silicon, and then increase that iron. This iron very often has considerable phosphorus, but not enough to do any harm. This is all the chemistry that any founder needs to enable him to make good castings. In this way he can use any gray iron that is cheapest in his market, or can use scrap in almost any quantity.

The name of an iron is not of much importance, but the price, and the way to make good castings out of it. I have told you this.

A chemist might try to give a formula for a good iron for soft gray castings, and might give a good one, but it would be the result of some analysis that he had made of a good casting, which would be the correct way, but just as good a casting could be made with very widely varied proportions, and when conditions varied it would be necessary to vary the proportions of silicon.

If you want to try this, take a casting that is satisfactory in every way and ask some chemist to tell you what that castings contains, and then have it analyzed and see how different it will be.

At one time I submitted a casting that had 30 per cent greater strength than would naturally be expected, and asked for a formula of its composition, and did not find any one willing to venture an opinion, and when I gave the analysis the composition was very far from that which would have been considered theoretically best, but the silicon was there to counteract all defects.

I want to beg pardon of the readers of THE FOUNDRY for saying so many things that I have said before, but so long as a founder will ask such a question it is evident that I have not made the subject plain to him. I have two other letters before me asking substantially the same question, which shows that the only hope lies in repetition.

The Gas Engine in the Foundry.

By GEO. A. TRUE.

It is somewhat surprising that, in considering the various powers which can be applied to foundry use, the gas engine has not received more attention. It is probably due to the fact that mechanical people, as a rule, are less familiar with the advantages of this power than are the manufacturers who are not in the machine trade, or in any other strictly mechanical line of business.

For a number of years, this type of engine has been steadily growing in favor with manufacturers of clothing, with printers, farmers, millers, elevator men, and in various kindred lines; but it does not seem to have made much headway, until recently, in foundries or machine shops. In fact, the mechanical world does not seem as well acquainted with the practical use of this power as does the farming community. One reason for this is probably that in foundries and machine shops the use of steam in some form is more or less necessary, and the managers have figured that if an engineer is necessary to keep steam on the boiler, they might as well use a steam engine. In some locations this may be a good reason; in others, it is not.

The past ten years has witnessed the introduction of thousands of electric motors in iron manufacturing plants in small units, driving isolated machines. There can be no question of the value of electric power in a great many cases for such duties, but there are many locations where a gas engine could be applied to similar service and where the actual cost of operating with a gas engine would not exceed 50 per cent. of the cost of operating by any other means.

Within the past month the trade journals have published notices of the installation of several gas engines by one large Eastern malleable iron plant. The foundry is especially a place to which the gas engine can be readily applied. As a rule, the groups of machines are widely separated as to location. The blower and tumbling barrels are very often located at extreme opposite ends of the shop. Very often it is necessary to operate the elevator at a time when no other power is required. Again, it is convenient to operate tumbling barrels when no power is required for elevator or blower. In such situations the gas engine can be readily

adopted. It is not dependent upon a central power station. It is an entirely independent prime motor, can be instantly started and stopped, and the consumption of fuel goes on only while the engine is operating. This is not strictly true of any other system. All other methods of power distribution are dependent upon a central power station. The gas engine is a unique factor as a prime motor.

But the greatest commercial value of the gas engine lies in the small cost of the fuel it consumes. In using the term "gas engine," we refer to the engine using either natural or artificial gas, or to the gasoline engine, which, as a rule, can be used with gas by making a slight change in the valve mechanism. Many engines now on the market can be changed from gas to gasoline instantly while running. It is common to speak of the cost of fuel consumption in these engines as about one cent per H. P. per hour. It will average less than this. In some of our large cities, where cheap natural gas is used, it will not exceed four-tenths of a cent per H. P. per hour. A two-H. P. gas motor, the fuel cost of which is eight cents a day, ought to be an interesting factor in power production.

In addition to the economy resulting from the low cost of fuel, the fact that a gas engine does not require a licensed engineer, and that any machinist of fair ability can look after it, and keep it in good running order in connection with his other duties, makes it a very desirable motor for shops where machinists or mechanical men are employed. There has been a great deal of talk about gas engines being unsatisfactory on account of frequent repairs and the inability of the purchaser to keep them in good running order. In about 90 per cent. of these cases the trouble can be traced, not to the engine, but to the fact that the proper kind of a man is not looking after it. The very fact that farmers, bakers, butchers, etc., have used so many of these engines, gives a hint of the cause of complaint. These people, as a rule, are totally unacquainted with mechanical details of any kind, and when a battery runs out, or any little detail about the engine gets out of order, they are unable to understand it, and become discouraged, without making any effort to remedy the defect. This is not true of a machinist or a mechanical man, because, with a very small expenditure of time, he can find the difficulty and remedy it. There is no reason why a few extra wearing parts should not be constantly kept in stock. They cost less than one month's fuel-saving usually.

In one large plant now being installed in a Pittsburg foundry, several large gas engines are being used to drive generators developing electricity, which is carried to electric motors running groups of tools throughout the plant. This is another admirable application of the gas engine, as it enables the manufacturer to produce his electric power at about one-half the cost of its production by steam, and this is a matter which ought to make the gas engine a welcome competitor, even to the electric motor manufacturers. In this case instead of being a rival of electricity, it is an aid, by becoming a prime generator of electric current.

The subject is a broad one, and cannot be covered in a short talk, but it is one worthy of study by those who are wrestling with the subject of a cheap and safe power.

There are undoubtedly a great many situations where steam and electricity are expressly indicated, but there are also many power conditions which call especially for the gas engine, and it will be surprising if there is not a larger demand for it among foundries, steel plants and machine shops in the future.

The Birthplace of Foundrymen's Associations.

Last month the Philadelphia Foundrymen's Association held its eighth annual meeting. With eighteen hundred dollars in the bank and a large attendance at their meetings, the Philadelphia association has not only a right to congratulate itself, the way it carries on its business might well serve for a model for other associations in which interest is waning.

The Philadelphia association is not the only organization of foundrymen to which that town can lay claim of being the birthplace. It was here that the American Foundrymen's Association was launched in May, 1896, and two years later we find Philadelphia again entertaining the men who formed the National Founders' Association. Thus we find that no less than three great organizations of foundrymen, each working with a

different object in view, have been formed within its border.

The work of all of these associations has largely been of an educational nature. Before their advent it was a very common occurrence to find foundrymen bidding on work, without knowing the cost of producing it. Many contracts were taken at a loss just in order that one shop might underbid another. At the present time but little difference will be found in bids received from different foundries, because the interchange of experience, which has taken place at these meetings, has learned the foundryman what it actually costs him to produce castings. As the cost of production is very nearly the same in any given locality- the proposals for turning out a certain kind of castings are practically uniform.

Although the National Founder's Association may be said to come closer to the practical affairs of the foundry than any other association, its members, too, have passed through such an educational training as would have been impossible without it. There is far less tendency among the foundrymen to work for glory than there was in former days. The financial outlay they have made has been but a small portion of what has been returned to them through the better understanding of each other.

An Old Landmark.

Speaking of the retirement from business of S. Jarvis Adams, of Pittsburg, the Pittsburg Commercial Gazette says:

"The sale of the business and plant marks the retirement of Mr. Adams as a foundryman after a half century of activity and over thirty years as owner and in active charge, which forms a remarkable chapter in Pittsburg's industrial history. His father, Calvin Adams, established the business here, which S. Jarvis Adams afterwards joined him in in 1837. At that time the business started as the Pittsburg Novelty Works, and the name has clung to it till the present time, although its features of that time have, for the most part, been dropped. The senior Mr. Adams embarked in business at Oak Hill, Green County, N. Y., and subsequently established plants at Cleveland, O., and Wheeling, W. Va., before coming here. His partner in establishing the business here was Livingston Roggen, and the original plant was at the corner of First avenue and Grant street. Calvin Adams was the first man to introduce the manufacture of malleable and gray forge iron west of the Allegheny mountains. The common coffee mill, which has been a familiar kitchen utensil for many years, was primarily an invention of his. The plant named years ago turned out as high as 600 dozen of these mills a day. Many other patents were the inventions of this Mr. Adams, among them being the common harness snap.

In 1870 the old plant was abandoned for another on the same street opposite. S. Jarvis Adams had been connected with the business for some time then, and when the new plant was put in operation it was under the name of S. Jarvis Adams & Co. The business outgrew this plant, and after a time another was established on the site of the present Eighteenth Regiment armory. Eighteen years ago this plant was destroyed by fire. For two years the business was continued by a temporary arrangement at the old gas works on Second avenue. Then the present plant was purchased. It was then the old Mitchell stove foundry.

Much of the output is controlled by patents. Nearly sixty of these go to the new company as purchaser of the business and the plant. One of the most important products of the plant is pipe balls, used in the manufacture of wrought iron pipe. Through a patented process these pipe balls are made at this plant and taken direct from the sand without varying one-hundredth of an inch. The most of the product in this line goes to the plants of the National Tube Company, outside of the National tube works at McKeesport, and to Spang, Chalfant & Co., A. M. Byers & Co., and other manufacturers of wrought iron pipe.

New Prices.

In our last issue we published a price list of castings gotten up by the Milwaukee Foundrymen's Association. Since its appearance several changes have been made to correspond with further advances in labor and material. We quote only such parts of the new list as shows additions or a change in prices. For comparison the reader is referred to THE FOUNDRY for October.

ARCHITECTURAL.

Columns, 1,000 lbs. and over, faced.....2¾c
Column plates, bolsters, post caps, bases, wall plates, wall anchors, and lintels, machining extra 2½c
Cresting 7c
Sill plates, step plates, platforms and risers, stringers, sidewalk tiles and frames, sidewalk rings and covers....4c
Ornamental work, facia, shell caps and bases, moldings, etc., not less than ⅜ thick 5c
Fence posts and post caps, ⅜ thick.....5c
Sash weights (grey iron).....2c
Sash weights, special.....3c

AGRICULTURAL.

Frames, Gears, Boxes, Pinions, etc....3½c
Fanning mill castings.....4c
Couplings (threshing mach).....3½c
Smutters and dust collectors, large pcs.3½c
Pump handles 4c

BENCH WORK.

Gated.

Castings that weigh 1 lb. or under per flask .....6 to 20c
1 to 1½ lbs. .....per flask, 6c
1½ to 2 lbs.....per flask, 5c
Over 2 lbs.....per flask, 4c

The above prices are for large orders.

Bed plugs 7c
Punch bag castings.....7c

BOILER CASTINGS.

Fire fronts, including boiler, fire fronts and ash pit doors.....per lb..2¾c
All other boiler castings, such as grate bars, bearings for grates, buckstays, cleaning doors and frames, wall plates, arch bars, boiler brackets, stack plates, etc. 2¾c
Rocking and shaking grates 4c

BRICK YARDS.

Dampers and brick machinery.....3½c

BRIDGE CASTINGS.

Bridge castings for city repairs from old castings 4c
Bridge wheels, chilled or turned, for repairs 4c
Large orders (machine work extra).....3½c
General price for bridge shops. per lb.
Up to 100 lbs 3c
100 to 500 lbs. 2¾c
500 to 1,000 lbs.....2½c
Over 1,000 lbs.....2¼c
For special cored castings add ¼c to above prices.

ELECTRICAL.

Dynamo.....3½ to 4c
Small parts of same.....4 to 5c

ELEVATOR.

Weights 2c
Elevator and conveyor casting, except sprocket wheels.....3¼c
Cast sheaves—For wire rope up to 20 inches in diameter.....3½c
20 inches to 60 inches diameter and larger.....3c
Cast sheaves for Manila rope, 5 ft. to 6 ft. inclusive.....4c

FANS.

Spiders, pedestals, strands, etc., for fans.3¼c

GAS AND GASOLINE STOVES.

Gas and gasoline stove castings....7 to 12c

KETTLES.

Cauldron and Pail.

3 barrel	$18 00
2½ barrel	12 50
2 barrel	7 25
1½ barrel	6 25
1 barrel	4 50
12 pail	4 75
10 pail	4 25
8 pail	3 50
6 pail	3 00
5 pail	2 50
3 pail	2 25

Discount 35 per cent.

LAWN FURNITURE.

Settees 7c
Vases 7c

Set up add 1c per lb.

LARGE MACHINE SHOPS, ENGINE AND PUMP CASTINGS.

Cylinders, dry sand or loam.....3½ to 4c
Cylinders, castings made off one-half pattern, extra .....⅛c
Dry sand and loam work.....3¾c
Engine castings, 100 lbs. or under.....3¼c
100 to 500 lbs.....3c
500 to 1,000 lbs.....2¾c
Over 1,000 lbs.....2½c
Bed frames included in above list.
Wheels with flange included in above list.
Ammonia castings .....6 to 8c
Rolling mill castings.....2½c
Electric crane castings under 50 lbs....4½c
50 to 100 lbs.....3¼c
100 to 500 lbs.....3c
500 to 1,000 lbs.....2¾c
Over 1,000 .....2½c

GEAR WHEELS.

Gear wheels, 25 lbs. and under.....5c
25 lbs. to 50 lbs.....4½c
50 lbs. and under.....4c
Add 15% to above price for split gears.

STEAM PUMP AND MACHINE SHOPS.

Jobbing.

Steam pump work, 50 lbs.....3¾c
50 to 100 lbs.....3½c
100 to 500 lbs 3¼c
500 to 1,000 lbs.....3c
Over 1,000 lbs.....2¾c

Cylinders, plain 3½c
Cylinders, steam jacketed.....4c
Boxes, hangers and machine castings, see classified list of large shops.

MISCELLANEOUS.

School seats, fronts or backs.....5c
Ink wells.....12½c

STABLE GOODS.

Oat boxes, hay racks, stall partitions, etc 4c
The above ¼ thick or less.....4½c
Barn gutters 4¾c
Hitching posts 4½c
Horse weights .....2 to 2½c

SPECIAL CASTINGS.
Rough.

Switches, frogs, track castings, per lb. .2¼c
Washers, ¾ inch and under, large lots. .2⅜c
Washers, over ¾ inch, large lots.....2c

STEAM HEATING.

Heating fronts and radiator stands and legs 4c
Water backs .....8 to 10c
Heater bases for coils .....4 to 6c
Hot air blower castings 1 to 25 lbs.
(See Bench List.)
25 to 100 lbs.....4c
100 to 300 lbs.....3½c
Over 300 lbs.....3¼c

WAGON AND SLEIGH GOODS.

Bolster and reach plates.....3c
Rub irons 2¾c
Sleigh knees and wagon brakes.....3½c
Mandrells and swage blocks.....3c
Sleigh shoes, car lots.....2c
Sleigh shoes, less than car lots.....2¼c
Sleigh shoes, jobbing special patterns .....2½ to 3½c

ESTIMATES.

In making estimates on work, use the schedule of prices given for castings, and charge all labor at rates stated.

To arrive at proper charge for—or to estimate price for castings not in schedule, use the following method:

1. Figure iron, melted and poured, at double the market price, at the time of making estimate, of No. 2 X Foundry Pig Iron delivered. (This item is intended to cover the cost of pig iron, waste, coal, coke, laboring help required to handle and pour the iron, and a portion of the general expense.)

2. Double the actual cost of all skilled labor on the job.

3. Add 50 per cent to the actual cost of all common laboring help on the job.

These three items should, when added together and divided by the number of pounds in casting, give us a fair price per pound for a charge or estimate.

This price is supposed to cover all expense and include a fair profit.

High Wages Means a Chance to Choose the Best Mechanics.

The Standard Foundry Company, which was recently opened, is enlarging its foundry. A contract for a $15,000 addition, which will nearly double the floor space of the present plant, has been let, making the total cost of the building nearly $30,000. An addition to Arnold & Pierce's Hammond street foundry will be opened to-day. Half a dozen molders will be given employment. Edgar B. Pierce, manager of the Wheeler Foundry Company, Mechanic street, has added to his floor space by a new building for molders.

An officer of the Union said last night that the foundry boom was never equaled in this city. Because of the existence of a minimum wage rate of $2.75 per day, molders from every section of Massachusetts are flocking to Worcester. The larger portion come from towns where there are no unions, and wages are high at $2.50 per day. The demand, however, exceeds the supply, and good molders are assured work in this city.—Worcester (Mass.) Spy.

At the annual meeting of the Pittsburg Foundrymen's Association, the following officers were elected: President, Dr. Richard Moldenke, of the Pennsylvania Malleable Company; Vice-President, S. D. Sleeth, Superintendent of the Westinghouse Air Brake Company's plant; Treasurer, Phillips Mathes, of the Brittan & Mathes Company; Secretary, F. H. Zimmers, of the Union Foundry & Machine Company; Executive Committee, I. W. Frank, William Yagle, Robert Taylor, B. D. Fuller, and E. A. Kebler.

A subscriber asks us where he can purchase celluloid wheels for burnishing brass castings, and also who makes machines for the separation of iron from brass turnings.

Pointers on Facing and Sand.*

(With Apologies to Paxson Catalogue No. 11.)

The gases in molding sand pass out when iron is poured into a mold.

When iron bubbles or boils, the gases are passing off the wrong way.

When gases pass up through the iron, it is because the sand is rammed too hard or is not properly vented, but Lumbarton sand does not act this way, as it can be rammed very hard, and requires but little venting.

Hard ramming closes up the porosity of the sand, but the vent wire opens it.

If you get burned or scalded ask for "Phenol Sodique" or "Balsam Apple." They are both good when applied with linen bandage.

Too much water used in mixing sand creates too much steam when the mold is poured.

Steam accumulating under liquid iron will raise and blow it up.

When iron bubbles or boils in a mold it will make a scabbed or bad casting. By using medium Lumbarton sand this should not occur.

Iron naturally seeks a soft bed. If poured on a hard bed it will bubble and fly.

The face of the mold should always be the softest.

Whenever hard ramming is required, it should be done on the outside portion of a mold.

A rammer should never be allowed to strike a pattern when ramming up a mold.

When ramming up the sides of a pattern the pene should not go nearer than one inch to the face; the butt should at least be kept one and a half inches from the face.

Too much depth of sand in ramming will be apt to make swells on the side of the casting.

In ramming courses of sand the rammer should be made to feel the under, or last course rammed.

Too much venting will seldom do any harm, but hard ramming will.

Learn to ram even and lightly.

Cores, or a projection that is surrounded by iron, should be rammed even and lightly, and also well vented, but the safest course is to use Millville gravel, sometimes called molasses gravel, because it feels as though it were mixed with molasses, and dry Core Compound as a binder; you can't make it blow.

Any bottom section of a mold that is covered rapidly with iron so as to have a pressure upon it, will stand harder ramming than where it is to be covered over slowly.

The lowest point of a mold's sides is the one which should be rammed the hardest.

The flat surfaces of copes will stand harder ramming than the bottom surfaces of the mold, and to make a facing sand that will ensure the sand in the cope from not drawing down, a mixture of two-thirds Lumberton and one-third Millville gravel should be used.

It is better to have the joints of your flask well secured, as it does not pay to have "run-outs," nor does it look well to have a lot of men around a flask with "bod sticks." Use Hawley or Josef clamps.

If there is not a good opportunity for gas and steam to escape downwards, it is seldom that there is pressure or body of iron strong enough to keep them from passing up through the iron, and thereby causing a casting to blow or be scabbed.

There is less gas in old sand than in new.

Facing sand, or sand having blacking, flour or sea-coal mixed with it, contains an increased amount of gases, and it is bad practice to use the three articles together; facing sand to give the best results should only be made by mixing about two-thirds old sand, one-third of new Lumberton sand, mixed with sea-coal, made at Irwin, Pa., from coal mined by the Penn Gas Coal Co.

Avoid using the swab as much as possible when finishing a mold.

Never patch a mold with a trowel when you can patch it with your hands or fingers.

*When Thomas D. West published "American Foundry Practice" in 1882, he embodied in this, his first book, one hundred items that apprentices should know and remember. The greater portion of these items should be borne in mind by the journeyman as well, and it would not do a bit of damage to have the shop manager master them also. When it comes to deciding what causes a blemish on a casting, and this must be done before a remedy can be suggested, the head of the shop will find himself better off for having studied these items, as originally published by Mr. West. Since that time several supply houses have incorporated them in their catalogues, some of the paragraphs being twisted around to suit certain particular articles handled by them. We present herewith sixty-two pointers from a catalogue lately issued by the J. W. Paxson Co., Philadelphia. Many of these will be familiar to our older readers, but all in all we believe they are worth reading once more.—Ed.

The less slecking done in order to properly finish a mold the better the casting will be. If No. 1500 East India plumbago is used as a blacking, and rubbed on with the hand where possible, you will prevent scabbing, and the casting will be bright and smooth and peel off clean.

Never sleck twice where once will do.

A hard-surface slecked mold is apt to cause cold shut and thin scabs on a casting.

The more ramming a mold will stand the more strain can be put upon it, and Lumberton sand will stand ramming. For heavy castings these last three numbers should be specially remembered.

A fast-poured mold should be well made.

It is not necessary that patterns should be jabbed full of holes in order to vent a mold.

One inch thickness of facing sand over a mold will peel a casting as well as a foot thick, providing good bituminous facing is used in the mixture. This facing ground at Irwin, Pa., is the best. (Contains more bitumen.)

The use of facing sand has caused more bad castings than common sand. The Centrifugal Sand Disintegrator will be of great advantage, as it breaks up the bits of clay in the sand, and gives you an even mixture that cannot be obtained in any other way. This machine makes good sand out of bad.

Using the facing sand too strong causes cold shut or streaked castings.

A cold shut casting is harder to deal with than a scabbed one. Scabs can be chipped off, but to hide cold shuts has puzzled many a molder.

Do not use facing sand one to eight when one to ten would peel the casting.

Whenever you cut out the bars of a cope, do not forget that bars in a cope are put there to hold and lift up the sand.

If you can avoid having gaggers sticking up above the top of a cope do so, as by this many a casting has been lost.

Avoid using thick, heavy gaggers as much as possible.

Never make a loam or dry-sand casting when you can make it in green sand; this saves money to your employer.

Dry-sand molds, as a general thing, should be rammed harder than green sand, but dry-sand work is very seldom necessary if you can procure Lumberton sand and Millville gravel, as almost any weight casting can be made with them in green sand.

There is an old maxim, that it is better to have a fin than a crush, the truth of which many old experienced molders have found to their sorrow.

Be sure that the cores are securely anchored. Tinned chaplets and anchors should be used.

Dry-sand mixtures depend upon what kind of sand or loam a shop uses; almost every shop has a different way of mixing dry sand and loam.

Do not use flour or resin as a binder to make core sand; they are uncertain; the thing to use is dry Core Compound; it is always ready, and there is nothing in it to blow.

A close mixture of loam or dry sand is very liable to scab, while if it is too open the mold will not stand the dropping or washing effect of the iron when poured.

To know what proportions of sharp and loam sands to mix together, a man must have experience, but some few places have a natural loam or dry sand like Lumberton sand or Millville gravel, that require no other mixtures.

Dry sand or loam molds, if not thoroughly dried, generally cause a casting to become scabbed.

A casting poured hot will finish up cleaner than one poured dull, but a casting poured with dull iron will take a greater strain or weight to break it than one poured with hot iron, but by using Columbo plumbago or Eureka blacking you can pour the iron as hot as you may desire.

Do not send a casting to the scrap pile if you can save it; use Metallic filler or Cement to fill up the holes or imperfections; smooth off with the hands; it dries as hard as adamant; you would never know it, and it finishes up like the casting itself—same color.

Best open-hearth and crucible-steel castings are made in sand mixtures as follows: Two-thirds Hard Silicia Sand, one-third Ground Silica Rock, with a small amount of Siliceous Clay, the whole being thrown into a pan grinding and mixing machine, and mixed with molasses to make it plastic; the molds are then made and painted with Excelsior mold wash, when they are run in the oven and well dried before pouring.

For chandelier and small brass castings use fine Philadelphia sand, put through a No. 60 riddle.

Wet blacking for cores or loam work

should be mixed with molasses water instead of clay; it should be mixed gradually, leading up from paste to the consistency required.

When pouring off after night use white soapstone facing or flour around the gates.

Brass castings should be tumbled in the "Todd Water Tumbling Barrel;" it washes the sand out of the cores and scrap, and makes a better color.

It is cheaper to buy hay rope than to make it, unless you have a machine to twist it; besides, it is more uniform, and can be had any diameter up to one inch.

Use "Apoleum" instead of beeswax; it is both cheaper and better for iron patterns.

If you want a good, all-round facing for a jobbing shop, that can be used as a heavy dust or as a wet blacking (when mixed with molasses or clay water), use I. X. L. facing; it makes the castings "clean as a whistle."

It takes two facings for stove plate castings and print work; "Banner Fire Proof" for bottom and "Premium Return" for top facing, to keep the pattern from sticking; this is up-to-date practice, and makes the finest castings in America.

If you want to make a nice finish, use Flexible Metallic Fillet on your patterns; it pays, as it will not warp or dry out like leather or wood.

My Foundry Experience in Arizona.

In July, 1893, at the request of Messrs. Fraser & Chalmers, of Chicago, I left that city for Jerome, Arizona, to superintend a foundry at the works of the United Verde Copper Company, of that place, and arrived at Prescott four days later. Here I had a few hours before the stage started. I came across a lot of old mining machinery in a lot, so I thought there must be a machine shop somewhere. After a while I discovered the machine shop, back of an old boiler. There were a lathe, a planer and some pipe tools, likewise a blacksmith's fire. The planer was about 12x18 inches, and the lathe about 12-inch swing; so you can see what their capacity was for doing repairs. In the yard I met two men, and talking with them I told them that I was going to Jerome to take charge of the foundry. "Oh, it's no use going there; they can't make any castings there." "Why, what's the matter?" "Well, I don't know," says the man. "They say that the flue dust gets in the sand, and the copper gets in the iron, and they can't make castings there anyway. They have been running the foundry and trying to make castings for the last eighteen months and haven't made any yet." Well, as I had traveled something near 2,000 miles to get there, I was not going to back out, but determined to go on and see things through.

In due time I arrived at Jerome, and the next morning I went up to the works and saw the superintendent. He introduced me to the master mechanic, who undertook to show me around the works. The first place, of course, was the foundry. The building was about 30 by 20 feet, with the cupola in the center of the end. There were two men in the shop molding slag and bullion pots. The slag pot is like a large bowl with a hub on each side, about two-thirds down the outside of the pot. These hubs are drilled for axles for wheels, also a bracket on the same line to fasten the handle that the men draw the pot with. These slag pots are made this way: The follow board is put on the floor and the pattern is put on, bottom up; then the cope is put on and rammed up, then it is rolled over and the joint is made. At this stage of the proceedings we got into the shop. The molder was riddling some sand for the inside of the pot. After he had riddled enough, as he thought, he put a shovelful in the pattern and started to ram; and, my! how he did ram that sand! After he got through with that shovelful I don't think you could have made a mark in that sand with a big sledge, and he rammed it up to the top the same way. So I thought of what the man in Prescott told me, and it was no wonder that they could not make castings in Jerome. Going out of the foundry we came across a man trying to chip the scabs off one of these slag pots. It was scabbed all over inside, and the iron was as hard as the hardest steel. He had about a wheelbarrowful of broken chisels lying near, but he could not chip off the scabs. Then we went into the machine shop. There were some wheels on the floor for the mine cars, and the worst lot I ever saw. Some were not run up in the arms, on others one-half of the flange was not run; then, again, there were some with the hub all blown away. I asked the master mechanic what he was going to do with them. He said, "Oh, they are all right; they are good castings if I can only bore them." After seeing the rest of the sights

around the works, I went to the foundry, as they were going to cast that afternoon.

I went up on the scaffold. The cupola was 42 inches inside diameter, with 8-inch lining. That made it 26 inches inside; hight from bottom plate to charging door, 9 feet. They had the cupola filled with coke and about 1,000 pounds of iron on top; that was all they wanted for the two pots. The bullion pot is square, with lugs on, about the same as the slag-pot, but the metal is thicker. It weighs about 620 pounds, while the slag-pot only weighs about 250 pounds. The depth of each is about 18 inches. Now, every foundryman knows what the result would be in placing about 1,000 pounds of iron on 800 pounds of coke. When the iron came down, it came as far as the tapping hole, and there was no need to stop it up with clay, as it stopped itself. After about twenty minutes' blowing, the man thought it was time to tap out; then came the tug of war. After sledging for half an hour, out came the iron, rolling down the spout like mud. There was what they called a crane in the shop. The mast was about 6 inches square and 12 feet long, with two 4 by 2 pieces for a jib, and the thing was stuck up against the wall with scarcely room for the mast to turn around. As soon as he got enough iron in the ladle he got it up and started to pour. "Fire the air; fire the air," he shouted. Previous to pouring he had put about a bushel of oily waste all over the flask and around the bottom board, so that when the air was fired there was a blaze 6 feet high going up all around the flask. Well, in about half an hour he tapped out again and got about 300 pounds in the ladle; he was going to cast the bullion pot this time. I made the remark that he did not have enough iron in the ladle to pour that bullion pot. "That don't matter; I don't know whether it will be good or not." But he put it in, and the consequence was that the casting was run short, and I suppose that was the way he had been working for eighteen months. No wonder he did not get any castings.

The next day I took hold of the shop. In the first place I found they had no coal dust to make facing sand; but there was a large plate near the door that I could use in making some. So I got some lump coal and a casting that had been made for a weight with a hole in the center. It was about 12 inches diameter and 6-inch face; so I put a spindle through the hole, and rigged it up something like a wheelbarrow, and it did very good work, grinding about a bushel in a couple of hours. There was some what they called plumbago blacking, but it was the poorest stuff that I have seen yet. It was a mixture of charcoal, coal dust, sand and very little plumbago. In due time I had molds enough for a heat. The cupola man and the molder left on the day I took charge, so I had to go it alone, and everything came out all right. I got some men from the smelter to carry the iron. The next morning the superintendent came in expecting to see the same fizzle as had been going on in the foundry. But he was agreeably surprised to find that the castings were all good. "How do you do it?" he asked. "We could not do that before." I told him that it was not hard to do when you knew the way.

Some little time after that they wanted some door frames for the smelter stacks, so I got the pattern made, but had no flasks for them, and I thought I would cast them in open sand. I had three or four in the sand when the master mechanic came in. "What have you got there?" he asked. "Why, those door frames," I said. "Yes, but what are you going to do with them like that?" So I told him that I was going to run the iron into them just as they were. "Why, do you think that the iron will run all around there? I don't think it will." "Well, all right," I remarked, "when I am ready I will send for you, then you can see it run around;" and when he saw it run around you never saw a more surprised man in your life. "Well, that is wonderful; we never had a man that could do that before." No, the reason was that any man that came along and said that he had met a molder on the road or had slept with one, they would give him a job.

The castings did not come out as soft as they ought to. The pig was soft enough, so I started to look for the cause of it. As most mining and smelting camps have an assayer, I took a sample of the coke to him for analysis, and found something over 3 per cent. sulphur in it; so as soon as I could, we got some coke from Connellsville. It cost in the neighborhood of thirty dollars per ton; but it is quite a ways from Connellsville to Arizona. The iron was all right after that.

As I did not see any new sand around,

I asked the superintendent where to get it. He told me that he would send some down from the quarry. So day after day went and no sand; but at last it came in the shape of sandstone; so it had to undergo the same operation as the coal dust, under the roller. So you can readily see that there was not much new sand used. At that time there was a mill lying on the ground, so I asked the superintendent if he would have it put up for me to grind the sand with. He said he would. But when it was up I could not get to use it as it was in use all the time to crush quartz for the converters, and when the converters were not working the engine was stopped for repairs, so that I had a time trying to get a little new sand.

Winter was coming on and the company was building a boarding house and a bunk house, as they call it there, and they wished to get some heating stoves for them. The superintendent asked me if I could make some. I told him that if he would get a good stove I would fix it up so that I could mold a lot. But he says, "Why not take the one you have there?" This was one that had been thrown out in the scrap, and I picked it up and used it for drying cores. The two sides were burned so that they nearly met in the center of the firebox; but he said that was good enough. I told him it would take longer and cost more than he could buy stoves. "Well, we have plenty of time." So I got the patterns fixed up and made some, and mounted the first one; but it took me about a day to do it. When it was done it exceeded my expectation. It looked fine.

About this time the proprietor, W. A. Clarke, of Butte, Montana, came. He generally came there once or twice a year, not more. He came to the foundry and introduced himself; asked me how I liked the place. I told him that I did not like the place, and that I could not do anything in that foundry. "Well," he said, "I have seen some of your work, and you are doing well, and I hope you will stop with us, and I will build you a foundry four times as large, so that you can do something; will raise your salary and build you a nice house to live in." I told him that I would stop there and superintend the building of the foundry; get him a man to run it, and then I would go back. But they were so long building the foundry that by the time it was finished I was more reconciled to the place, so that I stayed there nearly four years.

It was in laying out the foundry and crane that I found the books written by Thos. D. West came in useful, especially the drawings of a 10-ton crane; but as I did not want one as large as that, I condensed the drawings and made one that would lift about 5 tons. The new foundry was 40x80 feet, with the cupola built in a niche in the side of the building that was blown out of the solid rock for the purpose. For power I had a 12 horse-power common slide-valve engine, and as it was some distance to the boilers, we came to the conclusion to use compressed air, of which there was plenty. There was a small Baker blower in the yard, so we fixed that up for the blast, and when everything was in its place I thought I would try it. Well, I turned on the steam (air) and off she went for about three or four minutes. Then she commenced to slow down, wheeze and snort, and then stopped altogether. As I was lacking in experience in compressed air up to this time, I did not know what to make of it. The valve was all right. I knew that, because I set it myself, and it had not slipped. My son was with me and he looked through a hole in the side of the building where the exhaust pipe went through. He says, "There is ice on the rocks outside." I looked at him, as much as to say, "What are you talking about?" But to satisfy him I looked, and I found a big sheet of ice on the rocks, with a lot of small pieces on the ground—and this was in the summer, and about 90 degrees in the shade. Well, I took off a section of the exhaust pipe, to lessen the friction, as I thought, and then started her off again. She ran about ten minutes that time. I was coming to it, so off goes another piece, up to an elbow that was on the steam chest, then started her up again. She ran about thirty minutes this time; but this would not do, so I took the pipe clear off the steam chest. The result was a little better, but not good enough; but by putting some waste under the steam chest and keeping it on fire we could manage to get a heat off all right. If I had to use compressed air all the time, I was going to make a stove with a coil of pipe inside; then I don't think that I would have had any trouble, because at one time I found that it was troublesome to look after the fire under the chest, so I dug a hole in the floor around the pipe and built a fire in it, and that fixed it all right.

I would state that when she stopped once I took off the steam chest cover and found that the valve seat was coated with ice, so that it raised up the valve, and the air went in the exhaust and out; but it was a kind of a novelty when she started up, to see chunks of ice flying around the shop.—Thos. Wathey, in American Machinist.

Small Castings.

To turn out small castings quickly and neatly requires a little thought. Good appliances are necessary, and of these the most important are the boxes. They should be of standard sizes and interchangeable, with true joint edges and perfect fitting pins. The pins are of real moment, for many a waster can be traced to shaky pins, and no matter how much the box is held "turn about," if they are faulty the castings are more than likely to show over and under lapping joints.

The patterns should be nicely finished, and if made of wood suitably halved. To save tool work on the mold, all fillets, etc., should be on the patterns. If the patterns are not filleted on arrival in the foundry, the molder can put on temporary fillets of clay, beeswax, or red lead, and these will save much cutting and sleeking of the mold. With halved patterns a turning board takes the place of an oddside, and is much lighter to work. A gate can be cast and finished up to suit the arrangement of patterns on the board. This will save tool work on the box, and give much cleaner castings.

When working from solid patterns, "oddsides" are essential, and may be of sand or plaster. If the quantity of castings required from one set of patterns is small, an ordinary green sand oddside will answer, but for larger quantities more permanent ones are desirable. An oddside rammed up in dry sand, black-washed and dried, will last a fair time and give castings with good joints. For spanners, bicycle cranks, connections, and similar work, this form of oddside gives good working results. An oddside recommended by Mr. T. D. West has met with much success in our hands. The method of making it up is as follows: The sand used is very dry, and to twenty parts is added one part of litharge. The mixture is sieved through a fine sieve, and tempered to the consistency of ordinary molding sand by wetting with linseed oil. The oddside is firmly rammed with this mixture, and air-dried for about twelve hours. This will keep good for a long time and give true-jointed molds. Should the edges become broken, they can be mended with beeswax.

For light steel and malleable-iron castings plaster oddsides are extensively used. The worst feature this class of oddside possesses is that with constant use the joint edges become jagged or broken, and the oddside thus loses its most vital property—namely, that of giving a sharp, clean joint. An advantage the oil and litharge oddsides possess is that the joint edges, when broken, can be mended. Plaster ones cannot be so treated.

The arrangement of patterns on an oddside is an important factor in the quality and turn-out of the work. They should be so placed that as many patterns as the box will safely hold, or the gate run, can be included. With regard to casting small work, the metal must be emptied in with sufficient force to run the piece farthest away from the gate, and yet not strain the box.

A plan often adopted for light brass castings, such as plumbers' work, cock and valve mounting, where many nuts, washers, seats, and other plain castings are required, is to attach as many patterns as the box will hold to a cast gate, the whole forming one pattern. If nicely finished and a suitable turning board used, a good output can be maintained with patterns so fixed.

In order to maintain a high turn-out it is essential that the patterns be kept in good working condition. Wood patterns should be made from the harder kinds of wood, and suitably varnished. Metal patterns should be nicely finished and coated with a varnish that will not cause the sand to stick when drawing the pattern. After each day's work the patterns can be slightly warmed and well polished with beeswax; they will then be in good trim for the next day. Small gear wheels and the like, work better when frequently washed with naphtha. In fact, many a fine tooth wheel is the better for a rinse of naphtha each time of ramming up; the teeth draw much cleaner when so treated.

Where a large number of castings are required from the one set of patterns, plate molding gives far the best results, both as to turn-out and quality of work. Indeed, plate molding in "snap flasks" represents the highest turn-out as yet attained by hand

molding. Plates dispense with turning boards or oddsides and the oftentimes tedious operation of making the joint. Drawing a plate from the sand is a simple matter compared to drawing loose patterns, and with a plate adjusted to the "snap" or box pins there is no injury to the mold, which means a considerable saving of tool work.

By far the highest turn-out is to be obtained from one of the hydraulic machines at present in use. These machines ram, part, and close a box in a very short time, and will turn out from 100 to 300 boxes per day. But it is only in foundries engaged on constant repeat work that these machines are of much value. The preliminary expense of putting down a machine and the after-expense of getting up pattern plates are only to be thought of in the case of large repeat orders.—P. Longmuir, in Mechanical World.

Old Iron is Money Nowadays.

The local factories are now disposing of their old iron at better prices than for twenty years. Many who have accumulated it for some time are taking advantage of the present high prices and disposing of it at prices that would have been undreamed of a few years ago.—Meriden (Conn.) Journal.

All Conveniences for the Watchman.

Quite extensive improvements have been made at Merrill's artistic iron foundry at Foxcroft, Me., during the past few weeks. The new part recently added has been clapboarded and finished outside. A double floor has been laid in the new part, a large furnace for long iron built and new shafting hung. New stairs to the store-room of the addition have been built and tackle put in for raising the trap-door. Some of the machinery has been moved into the addition and the partition between the two rooms removed making one large room. A room over the foundry has been partitioned off and one of the workmen is to sleep there nights as a watchman. They now have a very conveniently arranged shop.—Dover (Me.) Observer.

The Ultimate Destiny of Old Iron.

One of the best known, and probably most incontrovertible laws of natural science is that matter is indestructible. Many descriptions of matter, however, if not absolutely destroyed, certainly change their form, and this is largely true of pig iron. The wear of iron in the form of rails, plates, bars, etc., is no doubt enormous, and so far as actual wear takes place, in a thousand different directions, the matter is irrecoverable. The case of a horseshoe is one of the most familiar. But even the horseshoe becomes unfit for further use after a certain amount of wear, and it then assumes the familiar form of scrap. Probably of the 506 million tons of pig produced from 1871 to 1896, more than one-half is still in use, in its original manufactured form. What has happened to the remainder? The question conjures up visions of accumulations of scrap that are difficult to allay.—Iron and Coal Trades Review.

Iron Returning.

Considerable comment has been made in several of the leading daily papers upon the fact that some pig iron which Rogers, Brown & Co. sold to Japanese customers some time ago, has been reshipped to this country. We have the following letter from Rogers, Brown & Co., which explains how this came about:

We have purchased several thousand tons which nearly closes out both the Japanese and Chinese lots. It was sold when prices were extremely low and it went to Japan and China on favorable freight rates. After the iron was delivered the natives thought it could not be gotten away and they refused to pay the price that was asked for it, and it is stated that they paid higher figures for English iron that was of inferior quality, believing it to be only a question of time when they would secure this American iron on their offers. The advance in values in this country has justified the owners of the iron in reselling it to us and the Orientals will probably find that they have overreached themselves.

Napier Charcoal Iron.

The Napier (Tenn.) furnace started up in the early part of this month. Considerable repairs have been made and an amount of raw material accumulated to insure a steady run. The Napier furnace has been out of blast for several years, but the brand will be remembered as one that was used for car wheel and foundry purposes. It will use all brown ore, and its fuel will consist of charcoal with a mixture of low sulphur coke. It is expected that the coke will have a beneficial effect in opening up the grain

of the iron and adding requisite amount of silicon. The product will be handled solely by Rogers, Brown & Co. and branch houses.

Phosphor Bronze.

Phosphor bronze has been so generally adopted for locomotive bearings that at the present time it may almost be regarded as the standard bearing alloy in American railway practice. The results of investigations by Dr. C. B. Dudley of bearing metals on the Pennsylvania Railroad, have undoubtedly had much to do with the general adoption of phosphor bronze as a railway bearing. The composition of the Pennsylvania phosphor bronze, and which, with slight variations, has been generally adopted by other railways, is as follows:—Copper, 79.7; tin, .10; lead, 9.5; phosphorous, 0.8. In order to understand the action of phosphorous in the manufacture of bronzes one must take into consideration the characteristics of their principal component, copper. Copper, in its molten state, exhibits a strong affinity for oxygen. If a crucible of molten copper be exposed to the atmosphere without having over its surface a layer of charcoal, glass, or protective covering, the metal will absorb oxygen from the air. Oxygen, when present in an alloy of copper, is extremely prejudicial to satisfactory results when a uniformly strong, tough structural bronze or homogeneous cool-running bearing is desired. In the manufacture of bronze it is almost impossible to prevent copper from absorbing some oxygen; therefore, to get rid of oxygen, recourse is had to the use of some flux or deoxidizing agent. Various fluxes for bronzes have been successfully used, among which are phosphorus, manganese, silicon, zinc, and aluminum, each having its special peculiarities.

The Stanton Heater Co., of Martins Ferry, Ohio, advise us that they have moved into their new and commodious plant at that city.

From recently collected data it is safe to say that there are, at the present moment, not far from 1,500,000 railroad cars rolling over the tracks within the borders of the United States. If we multiply the number of cars by the number of wheels we find that there are 12,000,000 wheels now rolling. Multiplying the number of wheels by their average weight we ascertain that they contain 7,200,000,000 lbs., or 3,000,000 net tons of iron. Assuming the average life of a car wheel to be ten years, 1,200,000 new wheels will be needed each year to replace those worn out in service; and this means a yearly demand for 360,000 tons of iron for making new wheels.—The Philadelphia Record.

(What is the matter with melting the old wheels over?)

Chester, Pa., seems to be a common camping-ground for steel foundries. No less than four big concerns are now engaged in the industry at that point.

The Northern Engineering Works, of Detroit, has issued Circular No. 80, describing their line of improved tumbling barrels, both geared and friction type, which will be mailed upon request.

The S. Obermayer Co., Cincinnati and Chicago, have opened up a St. Louis office and warehouse. The office, 309 Equitable Building, is in charge of Mr. E. D. Squier, who is well known to the foundrymen in that vicinity.

Henry Pels & Co., of Berlin, Germany, with offices at 66-68 Broad street, New York, have mailed us a booklet, setting forth the advantages of their portable machines for punching and cutting structural steel and like material by hand.

W. E. Williams, proprietor of the Prescott Machine Shop and Boiler Works at Prescott, Arizona, writes us that he considers there is a good opening for a small foundry in that locality, as there are no shops in that vicinity at the present. Further particulars may be obtained from Mr. Williams.

A Washington report states that there is urgent need in the City of Mexico for more foundries and machine shops capable of doing first-class work in reasonably prompt time. Maybe some consul has discovered this; at any rate, it will be well to investigate before loading your plant on the cars.

A report states that the Union Pacific Railway will add a foundry to its shops at Cheyenne, Wyoming. This is the only State or Territory within the Union in which we have been unable to locate a foundry. Even far-off Alaska has one foundry. This is located on Douglas Island, a few miles from Juneau, and one would naturally think that an island would be a rather dry place for a molder. However, this one is provided with ten saloons and a brewery.

Among the Foundries.

F. W. Mongerson will start a foundry at Alpha, Ill.

Samuel Guinn has started a foundry at McGregor, Iowa.

Douglass Bros., of Aberdeen, Wash., are extending their foundry.

The Harrison Safety Boiler Works, of Philadelphia, will build a foundry.

The Board-Cumming Foundry Co., of Chicago, will erect a new foundry.

Hench & Dromgold are building a new foundry at York, Pa., 47x140 feet.

The T. M. Chapman & Sons Co. are building a new foundry at Oldtown, Me.

Russell & Co., Massillon, Ohio, are increasing the capacity of their foundry.

The Ross-Meehan Foundry Co. is reported as intending to increase its facilities.

The York Mfg. Co., of York, Pa., has added a malleable foundry to its plant.

The Sheffield Car Company, of Three Rivers, Mich., has built a new brass foundry.

The Falcon Bronze Co., of Youngstown, Ohio, will build an addition to its foundry.

The Supplee Steam Engine Co., of Columbia, Pa., will build an annex to its foundry.

Wm. McClain and Polk Warner are building a foundry at Sulphur Springs, Indiana.

The Sessions Foundry Co., of Bristol, Conn., has added a fourth cupola to its plant.

The Ruggles foundry at Poultney, Vt., has been transferred to the Ruggles Machine Co.

A. A. Dresser & Co., of Lenox, Mich., have added a foundry to their other line of business.

The Southern Car & Foundry Co. intends shortly to place its works at Memphis in operation.

The Gross Foundry & Machine Co. is a new concern starting in business at Hillsboro, Ohio.

The Central Foundry Co. will double the output of the E. L. Tyler plant at Anniston, Ala.

The El Paso (Tex.) Foundry & Machine Co. has increased its capital stock from $10,000 to $20,000.

Epping, Carpenter & Co., of Pittsburg, will erect a new foundry during the early part of next year.

The Cohoes (N. Y.) Iron Foundry & Machine Co. has started a branch at Lansingburg, a suburb of Troy.

J. E. Bell has purchased a half interest in the foundry at Carthage, Mo., operated by Thompson & Scheckner.

The Detroit (Mich.) Brass Works have had plans prepared for a new brick foundry to be 40x120 feet in size.

F. W. Taylor, of Ripon, Wis., has purchased an interest in the Geddings & Lewis foundry at Fond du Lac, Wis.

A. S. Howard & Son, of Osawatomie, Kansas, write us that they will remodel their foundry in the near future.

The Christensen Engineering Company, of Milwaukee, Wis., is having plans prepared for a foundry 80x200 feet.

E. Bement & Sons, of Lansing, Mich., are having plans prepared for an addition to their foundry, to be 65x100 feet.

Landers, Frary & Clark, of New Britain, Conn., have let a contract for the erection of a new brass foundry, to cost about $6,000.

The Detroit (Mich.) Stove Works is having plans prepared for an addition to its foundry to occupy a space of 100x136 feet.

The proprietors of the Conneaut (Ohio) Iron Foundry have decided to enlarge the plant at once to meet increased demands.

The D. J. Murray Manufacturing Company, of Wausau, Wis., is erecting a larger foundry to enable it to handle its increased business.

The Bernstein Mfg. Co., of Philadelphia, is reported as intending to erect a foundry to be used for the manufacture of bedsteads.

James Duncan & Son, of Lykens, Pa., have made extensive improvements in their plant, putting in new machinery and a new cupola.

Mr. J. H. Bass, the well-known foundryman of Ft. Wayne, Ind., is reported as intending to establish a large malleable plant in that city.

A. Carlisle & Son have purchased the machine shop of James Christian, at Crowley, La., and will install new machinery and add a small foundry.

It is said that Congress will be asked to make an appropriation for the establishment of a steel casting plant at the U. S. Arsenal, Watertown, Mass.

The new foundry and machine shop of J. A. Barnes, Oshkosh, Wis., replacing the works destroyed last spring, are ready to be placed in operation.

P. H. Skidmore & Sons, proprietors of the Pacific Iron Works at Bridgeport, Conn., will double the capacity of their foundry in the immediate future.

Nolen & Jones have purchased the National Mfg. Co.'s plant at Huntsville, Ala., and same will be put into operation after a number of repairs are finished.

Hamilton & Henry are erecting a foundry at Algona, Iowa, together with a machine shop on the grounds of the Richardson foundry, burned some time ago.

The South Bend (Ind.) Foundry Company was incorporated with a capital stock of $10,000, and with H. L., Daniel, Florence E. and Marie L. Greene as directors.

Alfred W. Henry, C. A. Pullis and H. N. Henderson, of St. Louis, Mo., have incorporated the St. Louis Iron & Steel Foundry Co., with a capital stock of $75,000.

The Independent Foundry Co. has been organized at Port Chester, N. Y., with a capital of $40,000. It will operate the property formerly occupied by S. S. Bent.

A new company, known as the Pennsylvania Engineering Co., has purchased the plant at New Castle, Pa,, formerly known as the New Castle Engineering Works.

Mr. S. B. Claypool, lately general manager of the Republic Iron & Steel Co.'s plant at Birmingham, Ala., has become a member of the firm of Swinton & Co., Port Jarvis, N. Y.

The Herkimer (N. Y.) foundry will hereafter be conducted under the name of Jess & Warburton, Mr. Samuel Jess, of Ilion, N. Y., having purchased an interest in the business.

The Adams Company, of Dubuque, Iowa, will build an addition to its foundry, size 50x130 feet. The trolley system in use in the present foundry will be extended to the new building.

The National Foundry Co. has been incorporated in Hoboken, N. J., with a capital of $250,000. Incorporators: Henry H. Vanderbilt, Hoboken, N. J.; Nelson Adams, Albert P. Thill, of Brooklyn, N. Y.

The Merriam & Tilden foundry, at Greenfield, Mass., has been sold to B. B. Noyes & Co. It will continue as formerly under the management of W. A. Kenney. It is doing a very prosperous business.

The Marion Gray Iron Foundry Co. is having plans prepared for a foundry to be located at Logansport, Ind. The main foundry building will be 70x306 feet, and will be utilized as a molding room exclusively.

The Challenge Wind Mill & Feed Mill Company, of Batavia, Ill., will commence to erect an additional foundry as soon as possible. It is to be 125 feet wide and will be used for the manufacture of gasoline engines.

The Clizbe Bros. Mfg. Co., of Chicago, will remove their plant to Plymouth, Ind., where a foundry will be added to supply the firm with castings for grinding tools and hardware specialties, which it manufactures.

The Chattanooga Pipe & Foundry Co. has been launched at Chattanooga, Tenn., with a paid-up capital of $50,000, by J. F. Casey, Chas. Reif, M. M. Hedges, Geo. Reif, Jr., and Robert Pritchard. The firm will manufacture soil pipe as its leading specialty.

The Jones & Bixler Mfg. Co., of Freemansburg, Pa., write us that they expect to start their new works about January 1st, manufacturing iron toys, novelties and gray iron castings. They will be pleased to receive catalogues from manufacturers of machinery and supplies.

The Vulcan Foundry & Machine Company, formed of Pittsburg capitalists, has recently purchased the plant of the Vulcan Iron Company, of New Castle, Pa., and increased the capital stock from $35,000 to $75,000. The officers of the Vulcan Foundry & Machine Company are: J. S. Kaufman, of Pittsburg, President; John M. Watson, of New Castle, Pa., Secretary, and N. O. Strasberger, of Anderson, Ind., Treasurer. The plant is to be remodeled and its capacity largely increased.

The James F. Powers Foundry Company, of Elkton, Maryland, has been incorporated by James F. Powers, Dr. Charles M. Eills, Thomas J. Murray and George McQuilkin, with a capital stock of $20,000. This foundry has been running for many years, but on a very small scale. The new proprietors will make it one of the largest foundries outside of Baltimore. The buildings will be greatly enlarged in size, and it is expected that nearly one hundred molders will be given employment.

Local papers state that the Pittsburg Steel Foundry Company, which recently put its plant at Glassport, Pa., into operation, will soon let the contract for the erection of 100 dwellings ranging in size from three to eight rooms each. The location is said to be just a little above Glassport. The company officials want their men to live close to the works. The work will be started soon. The total cost of the houses is estimated to be about $125,000. A large force of men will be employed in the building of the houses.

The S. Jarvis Adams & Company foundry, one of the oldest and best-known manufacturing plants of its kind in the Pittsburg district, has been purchased by a syndicate of Pittsburg capitalists, and will be enlarged and improved. The new company will be known as S. Jarvis Adams Company, with the following well-known Pittsburgers as incorporators: Henry C. Fownes, J. Ramsey Speer, W. C. Fownes, Jr., Joseph McK. Speer and Charles McKnight.

The Grand Rapids (Mich.) Malleable Iron Co. has elected officers and will begin work November 1 on its new buildings. Several acres of ground will be needed. Five air furnaces will be built and the capacity will be 15,000 tons a year. The officers of the company are: President, Edward Lowe; vice-president, Henry Idema; secretary, D. M. Ray; treasurer, H. J. Hollister; members of board of directors, I. Preston Rice, Edward Lowe, J. C. Holt, Henry Idema, J. P. Ray and William H. Moore.

The J. G. Wagner Co., of Milwaukee, Wis., will build a foundry having a capacity of thirty tons of castings a day. The details of the foundry plans have not yet been fully decided upon, but the plant will cost about $60,000 and will give employment to about 180 men. It will take the place of the Wagner foundry recently destroyed by fire, and in which the company employed about 120 men. There will also be some extensions of the structural iron department of the plant, believed to be warranted by the great activity in the iron business. The Wagner Company employs about 800 men in different parts of the country. It has the contract for $380,000 worth of iron work on the new Chicago postoffice building, and an $82,000 contract upon the new Portland, Ore., federal building.

Fire Fiend.

Eusebe Picard's foundry, Quebec, P. Q. Damage $1,000.

The Knowles foundry, Ottawa, Ill., Oct. 16. Loss fully insured.

C. L. Stucks' foundry, at Hubbardston, Mich. Loss $6,000; no insurance.

William Hellers' brass foundry, 328 Noble street, Philadelphia. Loss $2,000.

General offices of the American Car & Foundry Co., at Berwick, Pa. Insured.

W. S. Cooper & Co., brass founders, Philadelphia, Oct. 28. Loss on stock, $50,000; insured.

Kearney (Neb.) Cycle & Machine Co.'s foundry and machine shop, Oct. 1. Loss $15,000. Insurance $4,000.

Henry T. Merriam's foundry at Millbury, Mass. Totally destroyed Oct. 25. Loss estimated at $3,500; partly insured.

Chadister & McQueen's foundry and machine shop at Braidwood, Ill., Oct. 25. Machinery badly damaged. Partly insured.

West Coxsackie (N. Y.) Iron Foundry, Oct. 10. Will be rebuilt at once, and the company announces that it expects to begin operations by the middle of December.

Personal.

William Braden has resigned his position as foreman of the foundry department of the Best Manufacturing Co.'s works at Pittsburg to take charge at the works of the Vulcan Foundry & Machine Co., at New Castle, Pa.

L. W. Bowers, who has been connected with Rice, Barton & Fales, of Worcester, Mass., for twenty-six years, much of the time as foreman in the foundry department, has resigned his position.

Deaths.

Chas. F. Baker, one of the founders of the Weir Stove Co., at Taunton, Mass., passed away October 18.

Harrington Sibley, a member of the firm of Heywood, Wilson & Co., of Fitchburg, Mass., died October 12, aged 85.

Herby Smith, for many years engaged in the foundry business at Salem, Mass., died in that city recently, aged 78.

Thomas Rourke, foreman of Pero's foundry at Worcester, Mass., where he had been employed for nearly thirty years, died October 10.

While on his way home from Europe, Mr. Lucian Sharpe, well known throughout the world by reason of his long connection with the Brown & Sharpe Mfg. Co., of Providence, R. I., died October 17, aboard the North German Lloyd steamer Saale. Mr. Sharpe was born in Providence, March 20, 1830, and early evinced an inclination towards mechanical pursuits. He served a five years' apprenticeship with Joseph R. Brown, a partnership being formed in 1853 under the name of J. R. Brown & Sharpe, the concern at that time employing about 14 men. From this small be-

LUCIAN SHARPE.

ginning sprung the Brown & Sharpe Mfg. Co., which to-day employs 1,500 men and occupies one of the finest and largest shops in the country.

Mr. Sharpe took great interest in his employes, educating them in a way that had never been attempted before. That he succeeded in turning out good workmen as well as good work is shown by the fact that a large number of the most responsible positions in manufacturing establishments at home and abroad are held by men who graduated from the shops of the Brown & Sharpe Mfg. Co.

The Reasons for Quitting.

We know of shops where they might be much better off if the superintendent or the proprietor would interview every man leaving his employment and draw from him, if possible, a frank statement of the real reason or reasons for his quitting. And it would be the duty of the men to tell him the real reasons without reserve.

There are shops that find it difficult to keep good men. They drift from bad to worse and finally their propriteors conclude that good men are no longer obtainable, and give up all idea of ever getting any of them.

They understand more or less thoroughly that conducting a machine shop is primarily a mechanical enterprise; that what they have to sell is the product of mechanical skill—the difference between pig iron and steel bars and finished, operative machines. They know that in order to sell the product of this skill they must first employ the skill; but when they have difficulty in continuously employing skilled men they often take no measures to find out why they have such difficulty, and the reason remains a mystery to them. They pay as good wages as other shops do, perhaps; have as good and pleasant shops in which to work, and are supplied with good equipment; yet men come and go, and seem always to be going faster than they come. Men do not continuously and unanimously leave a shop unless there is some reason for it; but in most cases they do not state these reasons to those who would be most benefited by knowing them.

It ought to be obvious that unnecessarily disagreeable features about a shop should be avoided. The best men can usually find employment in shops where these features are absent, and will inevitably do it. If, for instance, there is a "mean" foreman, one who seems to hate his men and treat them as though they all intended to be thieves and swindlers, and would be but for his vigilance; who brow-beats them and discourages thinking among them, the superintendent or proprietor should know it; but he stands precious little chance of doing so unless someone tells him about it. For this reason a frank statement made by each departing man would often result in great benefit both to the shop and to the men who work in it.—American Machinist.

Importance of Good Bearing Metals.

In "Sparks from the Crescent Anvil," published by the Crescent Steel Co., A. W. Cadman, of Pittsburg, writes from the stand-

point of a brass founder on the economy of using reliable bronze and Babbitt metals for bearings:

I take it, if the managers of manufacturing plants would pay the same attention to the materials used in the bearings of their machinery, as they do to the quality of tool steel they use, much information would be gained, and a demand for improvement in that department would soon manifest itself. In an experience of 35 years as a brass founder, the writer has seen many cases where money had been wasted and machinery bearings ruined, by the use of bearing metals that had no merit whatever but the doubtful element of cheapness in price per pound.

Bronze castings made of junk have no more value as bearings than iron castings made of burnt-out grate bars, and most of us have all the knowledge we want of them. So-called Babbitt's metals made principally of lead, and weighing six ounces per cubic inch, are dear at any price, when compared with the tin Babbitt's metals which weigh but 4¼ ounces per cubic inch, and never heat or cut journals. Tool steel is bought from manufacturers who have established a reputation for good quality. Bearing metals are frequently bought from the one who sells the cheapest, regardless of quality.

In buying Babbitt's metals, a good plan is to have a cylinder of brass or iron, 1⅛ inches diameter, and 1 inch long. By filling this cylinder with the metal, and turning it off exactly level with end of the cylinder, the result is a plug of nearly one cubic inch of metal, and if this plug weighs more than 4¼ ounces, it contains lead. The heavier it is, the more lead it contains, the poorer bearing it makes, and the quicker it will wear out journals.

Good bronze can be recognized by its outward appearance, but better by the grain when broken. It requires some experience to judge of the quality of bronze by its looks, unless it is very bad. Many of the machinery bronze castings now are loaded with lead, to the extent of 10 to 20 per cent. When globules of lead are found on the outside of a bronze casting, it is good evidence that it has a heavier load of lead than it can conveniently bear. When the proper quality of bearing metals is found, it is as good business policy to continue the use of that quality as it is to stick to one tried and proved make of tool steel, and the results are equally satisfactory and economical.

One Chemist's Opinion.

Yesterday in the foundry of the Amoskeag Manufacturing Company the iron in one melting pot did not run right. It boiled up like molasses over a fire. Captain Manning was called and gave it up. Some of this froth was cooled and shown to the chemist of the company. He analyzed the matter and examined the run and said that the cupola had become clogged and this had caused the slag to become unusually hot. The slag, which is iron and sand, had run out in its molten form and frothed up. Cleaning out the cupola remedied the difficulty. The melted slag, although 40 per cent. iron, was so porous that it was as light as cork.—Manchester (N. H.) Mirror.

The chemist seems to be gaining ground against all that is said about him. Up in staid New Hampshire he seems to have developed beyond his natural size. It would be interesting to know by what analysis he arrived at the conclusion that clogging a cupola would increase the heat of the slag. Generally when a cupola clogs up, everything begins to get dull. How under heaven the slag could contain 40 per cent. of iron and still be as light as cork is a mathematical problem that we should like to have solved.

A Smelting Machine.

The Brown Cotton Gin Company has added to its plant a huge smelting machine, known as a cupola. It will melt 10,000 pounds of metal an hour.—New London (Conn.) Day.

The J. W. Paxson Co., of Philadelphia, have issued their general catalogue No. 11, containing 372 pages of illustrated information concerning almost everything that goes to make up all kinds of castings.

A glance at this catalogue will not only convince the foundryman that there are a great many things connected with the foundry business of which he has never heard, but also that there are a good many things manufactured that he can buy cheaper than he can make them and obtain a better quality at the same time.

The extent of the business carried on by the Paxson Co. may be judged from the fact that no less than fifteen works, mills and factories are named as operated by them, together with several freight lines employing four steam barges, two tugboats and seven barges.

The variety of facing and blacking made by this firm requires fifteen pages for a short description of each, a casual glance showing forty-four different brands, calculated to meet every branch of the trade. Five pages are devoted to core compounds. Twenty-one pages are filled with a resume of the molding sands mined and handled by this company, the list being too long to repeat here, although we will say it covers sand and ma-

terial suited to the finest art castings up too crushed silica rock and ground ganister for steel castings.

The growing importance of molding machines is testified to by the Paxson Co., giving thirty-three pages of their catalogue to their presentation. The Paxson Collian cupola, made by the Paxson Co., and a short chapter on blowers takes up twenty-eight pages in the catalogue, followed by seventeen pages devoted to the lining of cupolas and appliances calculated to keep a heat running smoothly throughout. A number of pages in the latter part of the book, which, by the way, is of pocket size, is given over to useful information. Altogether the J. W. Paxson Co. has succeeded in putting together a great deal of good advice, dictated by their many years' experience in and contact with foundries in all parts of the country, and there are but few foundrymen, if any, who would not be benefited by reading through their catalogue No. 11.

NOTICE!

Advertisements in this column, 30 cents a line for each insertion About seven words make a line. The Cash and Copy should be sent to reach us not later than the 20th to insure publication.

Answers addressed to our care will be forwarded.

TO SUBSCRIBERS

whose names appear on our **subscription** list, we will give one free insertion under this heading to those in want of positions, the advertisement to occupy a space of not more than five lines. Additional space or insertions must be paid for in advance at regular rates.

WANTED—An experienced chemist and metallurgist. Address "Chemist," Box 324, care THE FOUNDRY.

FOR SALE—One 3 to 4 ton jib crane, hand power. Blue print and price on application. JAMES LEFFEL & CO., Springfield, Ohio.

FOR SALE (on account of sickness)—Foundry machine shop and feed mill; doing a profitable cash business. MRS. M. WARD, Newcomerstown, Ohio.

POSITION wanted as foundry foreman. Competent to handle work in loam, dry or green sand. Address H. G. S., Box 338, care THE FOUNDRY.

WANTED—A position as superintendent or foreman of stove mfg., January 1, 1900. Address, full particulars, "Experience," Box 328, care THE FOUNDRY.

FOR SALE CHEAP—One 15-ton structural iron jib crane, hand power. For price and description, address Vulcan Iron Co., Ltd., New Castle, Pa.

WANTED—A foreman to take charge of our foundry. Would prefer to let our shop by the ton to the right man. Address "Competent Foreman," Box 330, care THE FOUNDRY.

FOR SALE—Cupola; 84-inch diameter, hight from bed plate to top of stack 49 ft. 3 inches. For further particulars address Kansas City Car & Foundry Company, Kansas City, Kansas.

WANTED—A first-class foreman for malleable iron foundry; western man preferred. State reference, experience, age, wages. Address "Malleable Foreman," Box 334, care of THE FOUNDRY.

FOR SALE—One No. 4½ "Baker" blower; one No. 3 "Baker" blower; one 40-inch "Colliau" cupola, second-hand; good condition. For particulars address Benjamin Eastwood Co., Paterson, N. J.

FOR SALE—One No. 4 1-2 Baker Blower, now running, melting 5 tons per hour in 40 inch cupola. Have built larger cupola, requiring larger blower. JAMES LEFFEL & CO., Springfield, Ohio.

FOR SALE—Second hand. One 63-inch Boston blower, 11-inch outlet, good as new. One 5-ton foundry screw ladle, in good working order. AMERICAN HOIST & DERRICK CO., St. Paul, Minn.

WANTED—Position as foreman of foundry in Tennessee, Georgia or Alabama; 25 years' experience in machinery work; can handle negro labor; A1 mixer and melter; references, if required. Address "Machinery," Box 327, care THE FOUNDRY.

WANTED—Position as foreman. Understand the mixing and melting of brass and iron. Seven years' experience as foreman. Experienced in the operation of molding machines. References furnished. Address "Foreman," Box 336, care THE FOUNDRY.

WANTED—Situation as foundry foreman. Twelve years' experience in heavy and light work. Thoroughly posted in iron cupola practice and the handling of large forces of men. References supplied. Address "FOREMAN," Box 313, Care THE FOUNDRY.

CHEMIST AND METALLURGIST—Technical graduate thoroughly experienced in gray and malleable iron mixtures, desires to make a change. Also some experience in car wheel iron and in brass. References from present and past employers. Address "Chemist," Box 331, care THE FOUNDRY.

FOR SALE—On account of retiring from business, iron works and foundry fitted up for architectural iron work, machinery, sugar house and gas house work. Capacity of foundry 30 tons of castings per day. The plant is in good running order, containing complete patterns, flasks and machinery. For further particulars, address J. I. & F. F. Healey, Driggs ave., North 4th and North 5th sts., Brooklyn, N. Y.

FOR SALE OR TO RENT—On easy terms, an iron foundry, situated in one of the most progressive towns of Massachusetts, 15 miles from Boston and twenty-three

from Providence, R. I.; on the line of N. Y., N. H. & Hartford Railroad. Good shipping facilities, doing business at present. All the appliances of a first-class foundry; capacity of cupola, five tons. Will be sold or rented, as the present owner is in ill health, and wishes to dispose of it at once. For further particulars address "New England," Box 337, care THE FOUNDRY.

POSITION WANTED—By practical man as foreman of iron foundry doing heavy or light work. Expert in the use of all kinds of molding machines and up-to-date in cupola practice. A1 references. Address "Hustler," Box 340, care THE FOUNDRY.

SITUATION WANTED—By young man as Foundry foreman or superintendent. Light or medium weight machinery castings. Economic melter. Experience in Molding Machines. Firm intending to introduce up-to-date methods preferred. Salary moderate at start. Address "Progress," Box 339, care THE FOUNDRY.

WANTED—By manufacturing plant employing 150 men, in Southern Ohio, a man as superintendent or assistant superintendent. Foundry employs 40 molders, melting 12 tons per day; machine shop, wood shop and sheet iron shop. Factory running the year around on agricultural specialties in which there is sharp competition and it is necessary to get the work out with economy and dispatch. A competent and industrious man can have permanent employment and make himself valuable to the company. He must understand foundry practice and modern up-to-date machine shop methods, know how to handle men to advantage so as to get out the greatest amount of work at the least possible expense and educate new men to fill various positions. The proprietors thoroughly understand their business but want some energetic and industrious man to look after the details of getting out work. Address, stating age, experience, salary expected and full particulars with reference, "Foundry," care Matthew Addy & Co., Cincinnati, Ohio.

Electric Traveling Crane Motors.

Owing to the fact that crane motors are "intermittent workers," motor manufacturers have been in the habit of supplying machines too small for the work for which they are intended. They rely on the capacity of the machine for developing an additional 75 to 100 per cent for short periods, and thus bringing the maximum horse power up to what has been specified. The results in some instances have been curious, not to say disastrous. For instance, a crane maker might order a 10-horse power for his hoisting motor, knowing that he has a right to expect that machine to develop 17 to 20-horse power, for short periods, providing it is properly rated. But the motor maker supplies a 6-horse power machine, doubtlessly appeasing his conscience by his knowledge of the fact that it will develop 10-horse power intermittently. The consequences are what might be expected—injurious heating, excessive sparking at the commutator, frequently broken wires in the armature, and the total failure of the motor after a few months of dissatisfaction.

Latterly the best makers of electric cranes have the motors so arranged that worms, worm wheels and bevel gears and their concomitant evils are entirely dispensed with. In the earlier types, the power from the hoisting motor was transmitted by means of a worm to the hoisting gear, the idea being to make the crane self-sustaining without the use of a brake. Experience has proved that this arrangement, where heavy work is concerned, is not reliable, since in one instance a crane, constructed on this principle, allowed its load (a partly finished locomotive) to take charge of the motor and run down with a dangerously high velocity. Usually spur gearing is now used throughout in conjunction with an automatic magnetic brake. When current is switched on to the hoisting motor it puts into circuit an electro-magnet possessing sufficient power to raise the brake lever and render it inoperative at the moment that hoisting or lowering commences and also during its continuance. The act of "switching off" immediately, and without any attention whatever on the part of the operator, allows the brake to be automatically applied. It is necessary that the brake lever be fitted with a damping arrangement so as to prevent the excessive shock to the gearing that would otherwise arise in the event of the brake being too suddenly applied. The advantage of the magnetic brake is obvious. If from any reason during working operations, the current should fail, the brake lever would be instantly released, and the brake would take charge of, and sustain the load. Mechanical brakes of various designs and principles are sometimes used in conjunction with the magnetic brake just described.—Arthur Parrott in Cassier's Magazine for November.

The St. Paul Pioneer Press had better put another reporter to work getting up its news among the foundries. Last week, in order to make its readers understand that a coremaker was not a boilermaker it reeled of this specimen of misinformation: "The coremaker prepares the mold of sand with which the molder works." If this is so, what does the molder do?